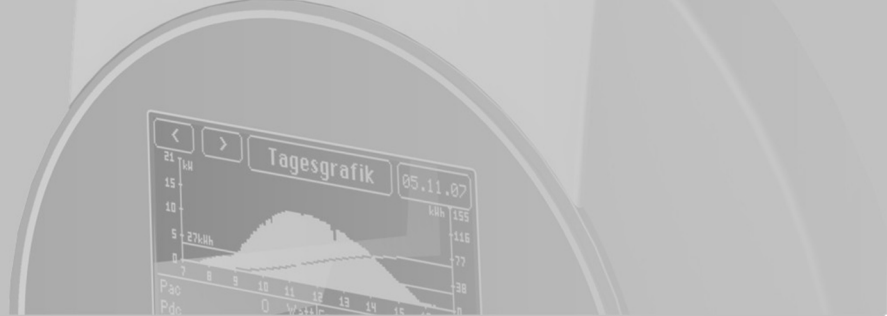




System Monitoring for your Photovoltaic Plant

SolarLog¹⁰⁰⁰



Manual

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1 Introduction

The SolarLog1000 represents the latest generation of the SolarLog series. Building on the web technology of previous devices, there have been many wishes and suggestions consistently implemented into this device.

The modern display with touchscreen and extensive connectivity options open up unprecedented possibilities. The new case design is not only aesthetically pleasing but also very practical. This allows all the cables to be kept hidden and at best completely invisible to the rear.

The SolarLog1000 is a device that can support a variety of inverters supported by its two data interfaces. Environmental data such as sunlight radiation and temperatures, even wind measurements can be recorded. The data can be loaded onto a USB stick and graphically analysed later on a PC.

The integrated S_0 pulse counter connection can connect digital electricity meters and hence measure electricity consumption. The SolarLog then automatically calculates an energy balance, offsetting its own electricity consumption.

Last but not least, the SolarLog1000 can attach large displays, through the S_0 pulse output, or parallel to the inverter via the RS485/EIA485 interface.

The Bluetooth module is optionally available with the SolarLog1000 and can connect the latest generation of SMA inverters wirelessly.

All these capabilities go to help ensure your photovoltaic system achieves the desired yield for a long time and problems can be quickly identified and resolved.

In this sense, we wish you every success working with the SolarLog1000 with many profitable and sunny days.

1.1 Standard practice

The manual consists of 2 parts. First, the installation process is described, i.e. the assembly of the SolarLogs and the wiring of the inverter to the SolarLog. Then follows the user's manual in which the configuration and further operation will be described in detail.

Please get to know the device before installing anything. Especially during the initial installation you should take some time to go through the manual - and not simply just "go for it".

1.2 Safety Instructions

Read first prior to startup, the following safety instructions.
Our products leave the factory in perfect condition.

In order to maintain this condition, care must be taken in dealing with the equipment (transport, storage, installation, startup, operation, maintenance, taking out of service). These safety instructions, model plates, labels and safety precautions must be observed, otherwise it can endanger people's lives and the product itself, and other installations can be damaged.

These safety precautions apply in the Federal Republic of Germany. When used in other countries the relevant national regulations apply.

If the information with these safety precautions should not be sufficient, you can contact the manufacturer at the given address at any time.

Please check the packaging and claim any damages immediately with the delivery company.

Make sure before turning on, that the power adapter has no damages. If in doubt, consult an electrician or get in touch with the address at the end of this manual.

Before turning on, please make sure the voltage of the device is identical with the mains supply in your country.

The device may only be operated with the included power adapter.

If the power adapter comes directly out of a cold environment to a warm environment, condensation may occur. Wait until the temperature compensation has taken place. To start the device without the temperature compensation is life-threatening!

Repairs should only be performed by authorized personnel. Please contact the mentioned address at end of the manual.

The power adapter should be checked regularly for damage. In the case of damage to the power adapter, it needs to be immediately taken out of service and replaced.

The device is not suitable for outdoor use

Before cleaning: unplug the device! For cleaning use a gentle detergent with a damp cloth. Never clean when dripping wet!

Other notes:

The SolarLog1000 operates on 12Volt DC (12VDC, max. 24VDC). Running the unit on a different voltage will invalidate the warranty. Please use only the enclosed power adapter.

The SolarLog1000 has IP20 standard protection and is designed exclusively for installation in dry, dust-free interiors.

The relay can be used with maximum **24VoltDC** and loaded to 5A.

Before any cable connection between the SolarLog1000 and inverter is made, the inverters must be without any power. That means the AC side must first be separated, then the DC-side. Then wait at least 5 minutes until the capacitors in the inverters have discharged.

1.3 Included in delivery

The SolarLog1000 is delivered with the following components:

- 1.SolarLog1000 – Basic Unit
- 2.12Volt Power adapter
- 3.Manual
- 4.Terminal block connectors for all connections: (except CAN): 2x 3-pin, 1x 4-pin, 2x 6-pin
- 5.4x wall plugs (dowels) and screws for wall mounting

For connection to a PC or network you need a network cable (RJ45 CAT5 or CAT6) in the corresponding length.

Furthermore, you will need suitable cable material for the wiring of the inverters to each other.

Optionally available are suitable, prefabricated cable-sets for the respective inverter manufacturers. The cables have a length of 3m.

2 Installation

The installation of the SolarLog1000 must take place indoors and protected from dust. For outdoor and dusty environments, the SolarLog needs to have appropriate protective housing.

The assembly is via 4 mounting points on the rear of the housing. This requires the removal of the two housing shells top and bottom.

2.1 Connection options

The SolarLog1000 has extensive connections at the housing bottom and top.

Bottom:

Relay	Relay, for switching external signals. For example rotating flashing beacon/light, etc.
RS485-A	First RS485/EIA485 interface. Connection to inverter, Sensor Box or large display (inactive, when the optional Bluetooth interface is in use)
RS485/RS422-B	Second RS485 interface (RS422 for Fronius/Phoenixtec). Connection to inverter, Sensor Box or large display
Power 12V	12 Volt DC voltage input (max. 24VDC)
Network	Ethernet network interface, 10/100 MBit
RS232/EIA232	RS232/EIA232 Modem Interface Connecting an analogue or GPRS Modem

Top side:

S ₀ In/Out	S ₀ pulse input for connection to external electricity meter. S ₀ pulse output for connection to external large display
-----------------------	---

Alarm	Contact loop for connection to anti-theft device. With optical cables transfers up to 5km.
CAN	CAN bus, for future extensions. Currently unused. No terminal strip is included for this socket.
USB	USB host connection. Suitable for USB sticks up to 2GByte capacity (Warning: Not suitable for connecting to PCs!)
Reset	Reset button. Multi-function: 1. Restart SolarLog, 2. Reset to factory settings

2.2 Connection to inverter

Since the SolarLog1000 communicates directly with each inverter, the appropriate data cable is required. For the connection of SolarLog1000 to the first inverter there are green terminal block connectors.

Note: pre-assembled cable sets, suitable for your inverter, are available as accessories.

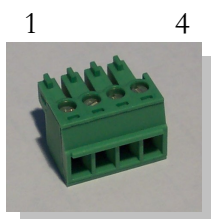
Since each inverter manufacturer uses different wiring and connections, you must have the relevant data cable connected correctly. The following chapters describe the manufacturer supported connection configurations.

Note: It is essential that you follow the instructions from the manufacturer for connecting the data cables. These instructions can be taken from the appropriate manufacturer's documentation.

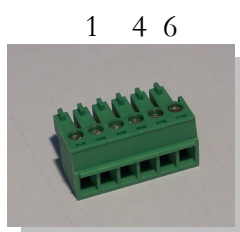
2.3 Terminal block connector

The SolarLog1000 has 2 RS485/EIA485 interfaces, each marked by "A" and "B". The "B" interface can also be used as a RS422 interface (for Fronius/Phoenixtec inverters).

RS485 A: 4-pin green connector



RS485/RS422-B: 6-pin green connector



The numbering of the connecting plugs are from left to right, from 1 to 4 and 6.

The assignment of the connectors are as follows:

Pin	RS485-A	RS485-B	RS422 (for Fronius/Phoenixtec)
1	Data+	Data+	T/RX+
2	12V	12V	12V
3	Earth	Earth	Earth
4	Data-	Data-	T/RX-
5			R/TX+
6			R/TX-

Note: The term "data+" / "data-" is manufacturer specific. Sometimes "A" and "B" are used/described here, or other combinations. Please adhere exactly to the description in this manual, otherwise the inverter will not be detected!

2.4 SMA

*Please note: For SMA inverters there are
2 different connection options, depending on which RS485-PiggyBack is built into the inverter.*

Careful! - different wiring!

Original SMA RS485 PiggyBack:

3-pin Wiring

Special RS485 PiggyBack:

4-pin Wiring

Both PiggyBacks can be fully integrated and installed into all SMA inverters of type "SunnyBoy" (exception: SB3000/4000/5000TL-20 Next Generation) or of type "Sunny Mini Central".

Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions in the SMA manual.

2.4.1 Note - PiggyBack mixed mode

The special RS485 PiggyBack can also be used in mixed mode with the original SMA PiggyBack modules. They must also have a 4-wire cabling in place. However, never connect clamp 2 (yellow SolarLog) with clamp 3 (inverter with Original-PiggyBack/Data Module)

2.4.2 Bluetooth Operation

Note:

1.The Bluetooth operation is only possible when the optional Bluetooth module is installed on SolarLog1000.

2. Currently only inverters SMA-SB3000/4000/5000-20 support wireless Bluetooth operation (May 2009)

For the Bluetooth operation, there's no preparation necessary on the inverter. The SolarLog1000 currently can read a maximum of 7 Bluetooth SMA inverters

The detection should take place in the same room as where the inverter is. This will stop detection failures due to lack of range. Afterwards, you can then test the SolarLog even further away from the inverter. Signal strength display is unfortunately not possible.

2.4.3 Special RS485 PiggyBack (Manufacturer: Solare Datensysteme Ltd.)

Note: Here a **4-pin** wiring is needed!

The special PiggyBack is a simple RS485 interface converter without controller or without its own "intelligence". Through the simple and robust design, disturbance behaviour on the inverter is eliminated. When correctly installed and in compliance with the installation requirements, the technical data and properties of the inverter remain unchanged. The PiggyBack is galvanically isolated and has a 6.5 kV isolation protection. Each PiggyBack runs individually a complete functional test on the SMA Inverter.

Note: The Special PiggyBack may only be combined and operated with the SolarLog1000.

The Special RS485 Piggy-backs are compatible with inverters of type

–SB-SunnyBoy (but not to the SB-3000/4000/5000TL-20 NextGeneration, here the original SMA RS485 Data module must be used)

–SMC SunnyMiniCentral

–SWR inverter (built from 2001 onwards). Possibly the display needs to be dismantled to add-on the PiggyBacks. This "space problem" exists also on the original SMA PiggyBack.

Please check the completeness of the supplied accessories:

1x isolation tube for data cable

1x Jumper

1x screw connection/feed through Inverter-PG 16 (M22)

1x flat power distributor for connection to housing/earth

2.4.4 Important Notes for Installation

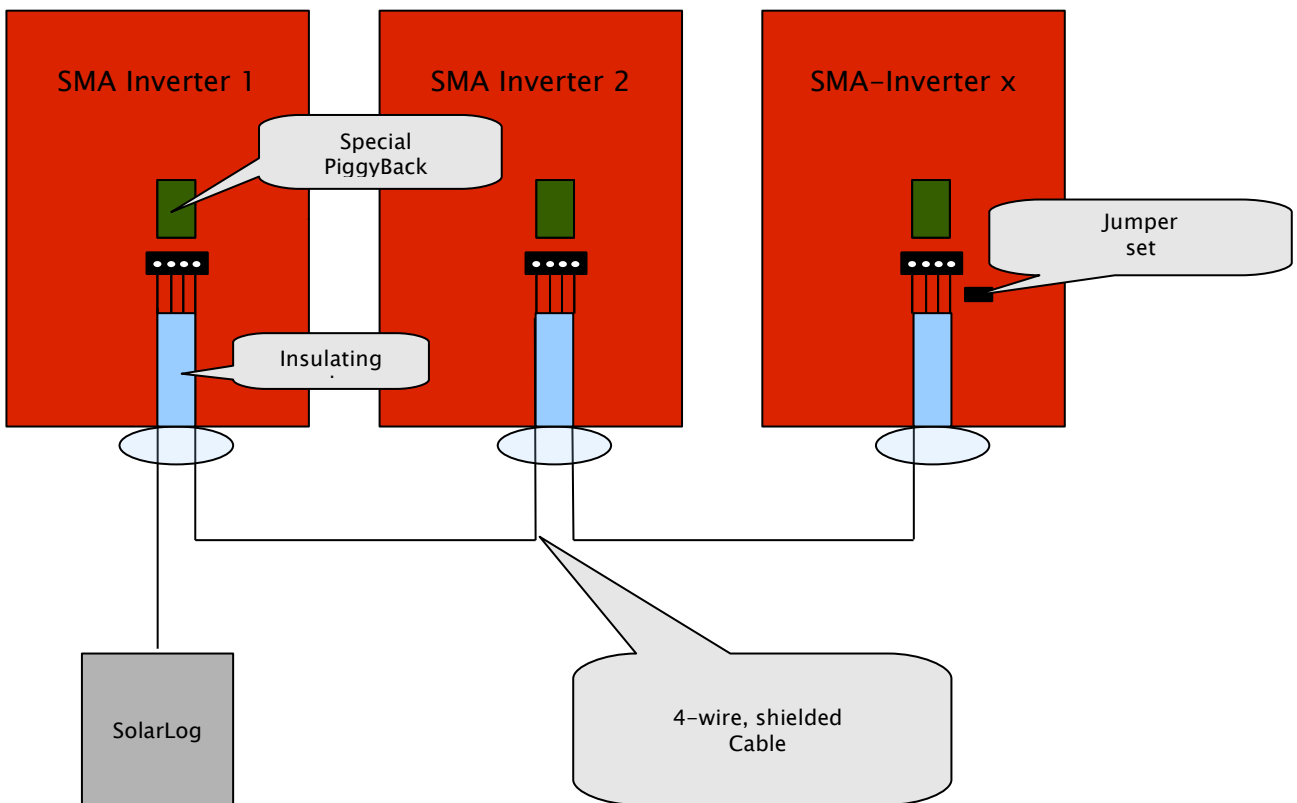
For the fitting of PiggyBack interface cards, the inverter must be opened. This may only be carried out by trained professionals. You should also read all the instructions of the available inverter manual.

2.4.5 Installation

Work on the inverter must be carried out exclusively with a separate power supply. First disconnect the inverter on the AC side, then from the DC side. Then wait 30 minutes until all the live parts are discharged.

Also, please note that in the inverter and on the interface card are sensitive electronic components which can be destroyed by static discharge.

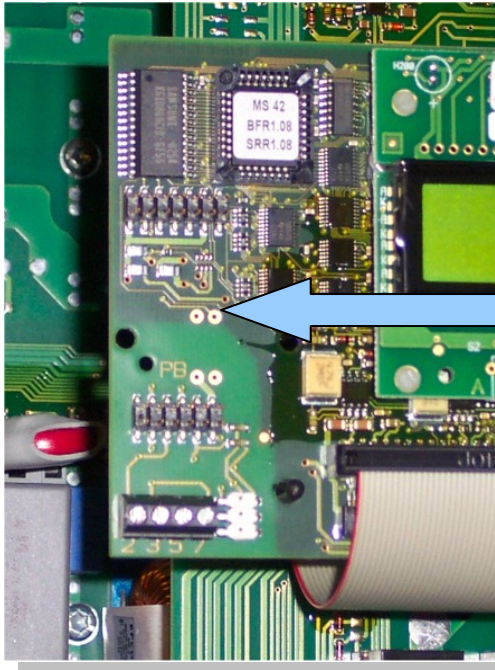
2.4.5.1 Wiring scheme



Step 1

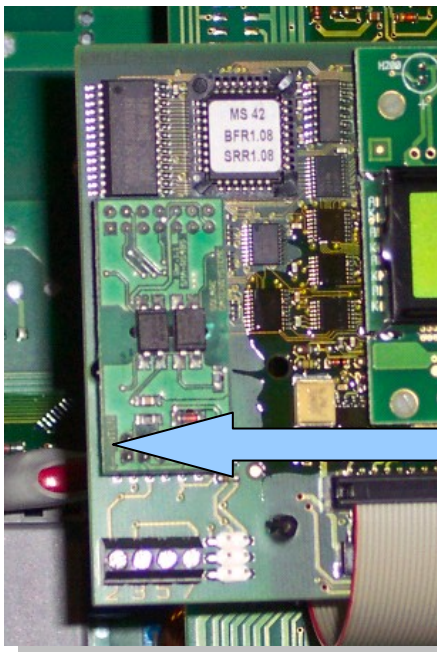
Insert first the PiggyBack on the control board in the inverter. Make sure the word "below" is visible on the bottom left side of the control board (see Figure 2 below). Note: The lower pin row must be aligned left.

2.4.5.2 Control board without PiggyBack



This is
where the
PiggyBack is
attached

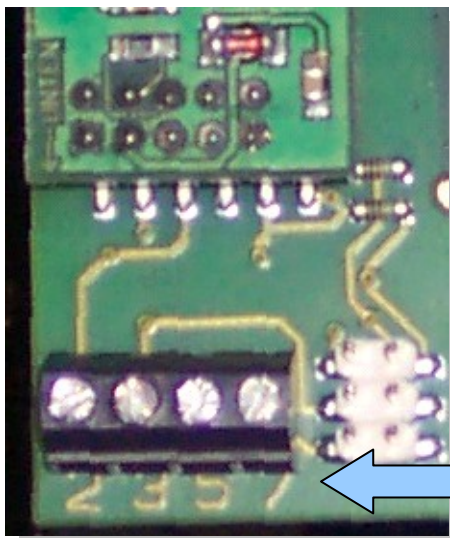
2.4.5.3 Control board with PiggyBack



Label:
Below

Step 2

Now the individual inverters must be wired to one another. You need a 4-pin, shielded data cable (e.g. 25m ring, Solare Datensysteme order no. 220014). Connect each of the 4 contacts (2,3,5,7) on the terminal block of inverter 1 to inverter 2 and inverter to 3, etc. until you have connected all inverters.



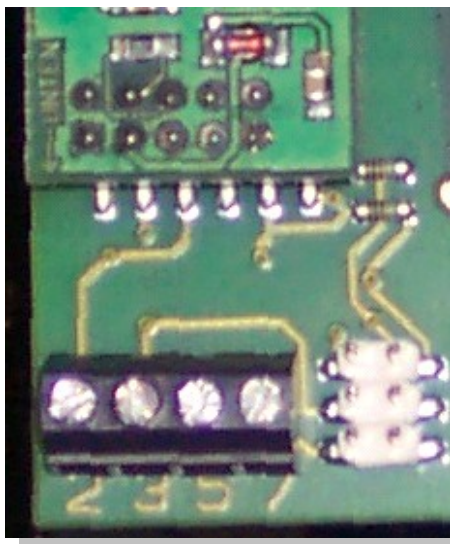
Terminal
block strip
Contacts
2.3.5.7

In older SMA inverters of type SWR there's possibly a 10-pin terminal block strip available. Connect here also the contacts 2,3,5 and 7 and leave the others free.

Please make sure that the data cable in the interior of the inverter is fed through the silicone insulation strips.

Step 3

A terminating resistor has to be set on the last inverter. Set the jumper to the lowest position:



Jumper set
(bottom)

The middle and upper position must remain free!

Step 4

Now you need connect the first inverters per cable with the SolarLog.

For the connection of SolarLog with the first inverter you can use either a prefabricated data cable (not included) or your own cable.

Pull the exposed wires through the cable opening of the inverter and connect them

<u>SolarLog</u>		<u>Terminal strip in the inverter</u>
White	(1)	2
Yellow	(2)	3
Green	(3)	5
Brown	(4)	7

Pull the data cable through the enclosed insulation tube. Connect terminal strip 5 of the inverter with the accompanying flat pin on the inverter casing.

This completes the hardware installation. You can close the inverter and turn it on.

2.4.6 Original SMA RS485/EIA485 PiggyBack (Manufacturer: SMA)

Note: A **3-pin wiring** is required!

The installation is very detailed in the SMA PiggyBack manual, enclosed with the interface board. The wiring of the inverters with one another is described on page "6 from 8" under "Wiring a SB/SWR via RS485 to a PC". Connect each individual inverter as in the SMA manual with a shielded 3-pin data cable.

Then you set jumper A on the PiggyBack of the last inverter as shown on page "5 of 8" and "6 of 8" in the SMA's manual.

For the connection of the SolarLog with the first inverter you can use either a prefabricated data cable (accessories not included) or your own cable.

Pull the exposed wires through the cable opening of the inverter and connect them

<u>SolarLog</u>		<u>Terminal strip in the inverter</u>
White	(1)	2
Green	(3)	5
Brown	(4)	7

Pull the data cable through the enclosed insulation tube. Connect terminal strip 5 of the inverter with the accompanying flat pin on the inverter casing.

This completes the hardware installation. You can close the inverter and turn it on.

2.5 KACO - Powador / PVI-Blue Planet with RS485/EIA485 interface

Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions in the KACO manual.

2.5.1 Powador

All Powador models have the RS485 interface already integrated from the factory. The interface must be activated through the operating display. Additionally, each inverter needs a separate communication address assigned to it. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, etc. Again, this setting will be carried out via the operation display. Follow the instructions in the KACO manual.

The KACO-Central Inverters are shown as 3 separate inverters in the SolarLog. If for example two central inverters are available and assigned with address 1 and 2 per RS485 interface, that would give a total of 6 inverters showing up in the SolarLog.

2.5.2 PVI-Blue Planet

The PVI-BluePlanet models were shipped up to the middle of 2005 and shipped from the factory with an optional RS232 or RS485 fitted. To operate with the SolarLog1000 the RS485 option is absolutely necessary. The changing of the interface is possible via the Kaco company. Please ask your installer about this, or KACO directly.

Each inverter needs to have a separate communication address assigned to it. Assignment is made via a DIP switch inside the inverter. Follow the instructions in the KACO manual. It is advisable for the addresses to start at 0, i.e. 0, 1, 2, 3, etc.

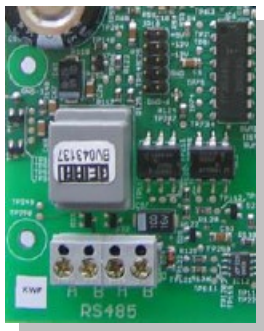
Note: If the DIP switch is missing on the control board, then it's the RS233 version of the PVI-Blue Planet inverter.

2.5.3 Wiring

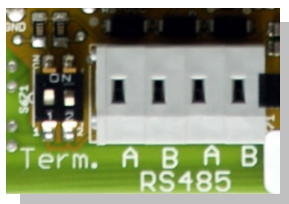
The wiring of each inverter is carried out by terminal strips that are placed and located inside the device.

2.5.4 Terminal block - Powador - Models:

Powador built prior to 2006/2007



Powador from 2006/2007 onwards (Termination via DIP switches)



Powador 8000xi (6400xi/7200xi):

The 8000xi models are interesting from a cabling side, because here, three 8000xi can be combined together in a group. Similarly, it is also possible to use 1 or 2 devices without grouping them. The wiring is always completely different. Detailed instructions can also be found in the Installation manual for KACO inverters.

8000xi as a group:

- Here, one of the three inverters is set per jumper as the "Master" whereas the other two act as a "slave". Warning! A set jumper ALWAYS means "Slave", pulled jumper ALWAYS "Master" - regardless of the labelling on the motherboard. That means, on the master inverter, the jumper should be pulled, the two slaves must have the jumper set.
- The data cable of the SolarLog will be attached to the terminal strip "LOGGER" of the "Master" inverter
- The 3 inverters are also connected amongst each other via the terminal strip "SYM" .
- All 3 inverters must be equipped with a sequential RS485/EIN485 address which can be configured via the display on the inverter.
- „SYM-Bus" needs to be turned to active on the display of the inverter

8000xi separately:

- Inverter changed to "Slave", i.e. the jumper has to be set.
- The data cable of SolarLog will be attached to the terminal strip "SYM" of the "slave" inverter
- All inverters must be equipped with a sequential RS485/EIN485 address which can be configured via the display on the inverter.
- „SYM-Bus" needs to be turned to inactive in the configuration on the display of the inverter

2.5.5 Terminal block - PVI-Blue Planet - Models:



Connect each inverter with each other as in the Kaco manual with a shielded 2-pin data cable via the RS485 terminal strips. There are two RS485 ports, so that the wiring can be passed through. Connect each terminal A with terminal A of the next inverter and accordingly with the terminals B.

For the connection of the SolarLog with the first inverter, one can use either a prefabricated data cable (accessories not included) or your own cable.

Pull the exposed wires through the cable opening of the inverter and connect them

<u>SolarLog</u>		<u>Terminal strip in the inverter</u>
White	(1)	B
Brown	(4)	A

BluePlanet / Series 1- Powador:

In addition, a terminating resistor with 330Ohm (enclosed with inverter) needs to be set at the terminal block on the inverter furthest from the SolarLog. The terminating resistor connects the free terminal A with terminal B.

Series 2-Powador:

In addition, a terminating resistor on the internal DIP switch (see picture above) to the furthest inverter from the SolarLog must be set. Please take care to switch DIP switches from the other inverters to "Off", otherwise it won't be possible to have correct data communication.

Note: If the cable lengths are kept relatively short, the terminating resistor may be omitted in certain circumstances.

2.6 SolarMax - Series S, C and E with RS485/EIA485 interface

Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions of the Sputnik/SolarMax manual.

2.6.1 S and C Series

All the S/C models have the RS485 interface already integrated from the factory. Each inverter needs to have a separate communication address assigned to it. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, etc. Again, this setting will be carried out via the operation display. Follow the appropriate instructions in the SolarMax manual.

S Series: See to it on the inverter's display that only the RS485 interface is enabled (factory default), and not the built-in Ethernet interface.

Note: The factory default address setting of the inverter is 255, which is not a valid address number. Therefore, even if only 1 inverter is attached to the SolarLog, the address has to be set manually to "1".

2.6.2 Cx Series

The Cx-series models do not contain any RS485 interfaces and need to be retrofitted. Please contact in this case the installer or manufacturer.

2.6.3 E Series

The E-series models have no communication interfaces, which means an interface has be fitted before being able to attach to the SolarLog.

Please follow the installation instructions that are attached to the relevant interface. Pay particular attention to the proper setting of the RS485/RS232 Jumpers and the terminating resistance on the interface card (See manual of the interface card).

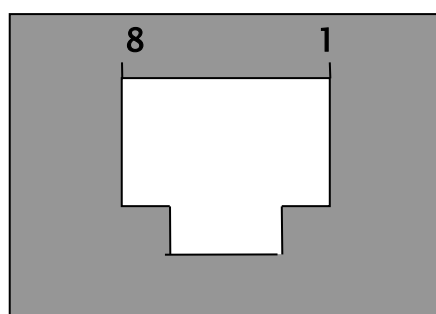
Each inverter needs to have a separate communication address assigned to it. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, etc. Again, this setting will be carried out via the operation display. Follow the appropriate instructions in the SolarMax manual.

2.6.4 Wiring

Use the RJ45 format for attaching and connecting the RS485 data cable plug to the inverter. These are the same plugs as in conventional network patch cables.

Warning! The SolarLog also has an RJ45 socket. Please under no circumstances connect this socket to the RJ45 socket of the inverter. This could destroy the SolarLog!

Note: We recommend the prefabricated SolarMax data cable, which is available as an accessory. If the cable is custom-made, then use the following termination circuit:



RJ45-plug from the front

<u>RJ45 Pin</u>	<u>SolarLog RS485</u>
1	2
2	2
3	3
4	3
5-unused	
6-unused	
7	1
8	4

The wiring of each inverter to each other is carried out with conventional network cable, with a RJ45 plug fitted.

SolarMax S/C Series:

The wiring can be done at anytime because the inverter doesn't have to be opened.

At the bottom of the device you'll find the two RJ45 connectors for plant communication. Insert the plug of the cable into any socket on the first inverter. The other plug of the cable can be inserted into any socket on the second inverter. That's how to connect inverter number 2 with inverter number 3, etc.

Attach the last inverter with the last free jack to the SolarLog using the prefabricated SolarLog data cable with the RJ45 plug.

SolarMax E Series:

Turn off the electricity or wait till evening (the entries on the display for setting the communication address needs to happen during daytime)

Since the RJ45 connector sockets are on the inside of the inverter on the interface card, the network cable needs to be threaded through the cable feed-through at the bottom of the device. Except for the first inverter, you always feed two cables: One cable from the previous inverter and one cable to the next inverter or to the SolarLog. Plug the cable from the previous inverter from the left socket with the inscription "RS485 in" to the cable on the next inverter in the right socket with the inscription "RS485 out".

Attach the last inverter with the last free jack to the SolarLog using the prefabricated SolarLog data cable with the RJ45 plug.

2.7 Fronius - IG 15-60 (HV) and IG 35 + to IG 150+ with ComCard

Important note: Never open the casing of the inverter if it is live. Strictly observe the instructions in the Fronius manual.

Before the SolarLog1000 can be connected to the inverter, an interface board called a „Com-Card“ needs to be installed.

2.7.1 Installation Fronius ComCard

The ComCard can come installed from the factory on the inverter or a ComCard can be installed later on as a retrofit.

Note: The inverter must be opened for the fitting. Please follow strictly the guidelines of the Fronius IG manual with your inverter!

The installation of the ComCard is very detailed in the inverter manual, follow all the instructions there.

We recommend to leave a free slot between the installed ENS card and ComCard.

2.7.2 Communication Address

Each inverter needs to have a separate communication address assigned to it. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, etc. Again, this setting will be carried out via the operating display. Follow the instructions in the Fronius manual from the chapter "Operational concept", section "setup Menu".

2.7.3 Wiring

The wiring of each inverter to each other is carried out with conventional network cable, with a RJ45 plug fitted.

Each ComCard has two RJ45 jacks, each with "IN" and "OUT" marked. It is very important to adhere to the right order with the cabling, otherwise no data exchange can take place.

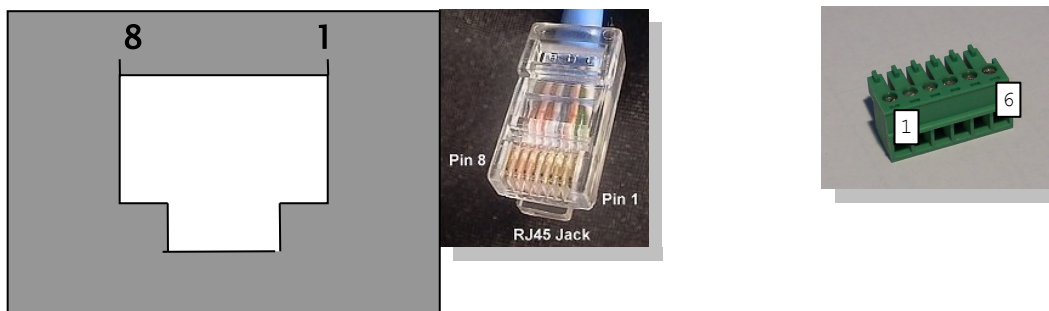
Warning! The SolarLog also has an RJ45 jack. Please under no circumstances connect this jack to the RJ45 socket of the inverter. This could destroy the SolarLog!

As Fronius can use a RS422 interface, only use the 6-pin RS422 B connection with the SolarLog.

Note: We recommend the prefabricated Fronius data cable, which is available as an accessory. The cable set includes a terminating plug (which has no terminal resistance!)

If the cable is custom-made, then use the following termination circuit:

RS422 B:



RJ45-plug from the front

<u>RJ45 Pin</u>	<u>SolarLog RS422 B (6. pin)</u>
1	-
2	-
3	5
4	1
5	4
6	6
7	-
8	-

Terminating plug:

The terminating plug consists of an 8-pin RJ45 blind plug, in which the following wires are bridged:

RJ45 PIN bridged
3 and 4
5 and 6

over the prefabricated cable with the 6-pin, connect now the SolarLog RS422 B with the IN jack of the first inverter.

Then connect all inverters via Inverter-1 OUT with Inverter-2 IN, Inverter-2 OUT with Inverter-3 IN etc.

In the OUT jack of the last inverter plug in the termination plug.

Note: The LED-E on the SolarLog shows the communication status. As soon as all cables are correctly plugged in and all inverters are active, the red LED turns off.

2.8 Danfoss - Inverters

Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions in the Danfoss manual.

The company Danfoss (PowerLynx) produces also for other manufacturers, e.g. for IBC (Serve-Master) or CentroSolar (Powerstocc®) or in the past for Kyocera (KCx) and SolarWorld (Sun-Plug).

These devices are largely identical and use the same data protocol.

The interfaces could however deviate.

The SolarLog supports all devices from the company Danfoss

1.UniLynx

2.TripleLynx

2.8.1 RS485/EIA485 interface

A RS485/EIA485 interface is required for monitoring data with the SolarLog. This interface for UniLynx inverters from February/2007 onwards is already built in from the factory. Previous models were delivered equipped with either RS485 or a wireless interface. The wireless interface can't be used with the SolarLog. In this case, the RS485 interface needs to be retrofitted by a Solar Engineer.

All TripleLynx models have the RS485 interface already built in.

Additional settings on the display are not necessary.

If the TripleLynx devices have an internal modem (e.g. GSM) installed, this must be disabled, otherwise the RS485 interface of the inverter is inactive! Please contact your inverter supplier concerning this.

2.8.2 Wiring

The wiring of each inverter to each other is carried out with conventional network cable, with a RJ45 plug fitted. The two RJ45 jacks are located on the right side of the inside cover, which can be screwed off. Please follow the instructions for that in the Danfoss manual.

Then connect all inverters with each other via conventional network cable.

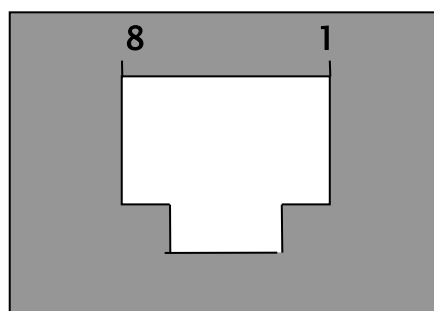
Insert the plug of the cable into any socket on the first inverter. The other plug of the cable can be inserted into any socket on the second inverter. That's how to connect inverter number 2 with inverter number 3, etc.

On the free jack of the first inverter, plug in either the Danfoss data cable (accessories not included) with the RJ45 connector or the self-assembled cable.

Plug the terminating plug into the last free socket on the last inverter.

Danfoss/PowerLynx wiring:

RS485:



RJ45-plug from the front

<u>RJ45 Pin</u>	<u>SolarLog RS485</u>
1	3
2	3
3	4
4-unused	
5-unused	
6	1
7-unused	
8-unused	

Terminating plug:

The terminating plug consists of an 8-pin RJ45 blind plug, in which the following wires are bridged:

RJ45 PIN bridged
 3 and 4
 5 and 6

2.9 Mitsubishi with RS485/EIA485 interface

Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions in the Mitsubishi manual.

All inverters from Mitsubishi have the RS485 interface already integrated from the factory. Additionally, each inverter needs a separate communication address assigned to it. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, etc. Again, this setting will be carried out via the operating display. Observe the instructions in the Mitsubishi manual. (The address number 1 is the default for all Mitsubishi inverters)

2.9.1 Wiring

The wiring of each inverter to each other is performed by conventional telephone cable, with an RJ11 plug fitted. RJ11 connectors are normally 6-pin, but only the middle 4 pins are used, which are sufficient. It is important that the 4 (or 6) Pins are looped through 1 to 1.

Both RJ11 jacks are located bottom left on the inside of the inverter. For the installation, the front panel of the inverter has to be removed. Please follow the instructions for that in the Mitsubishi manual.

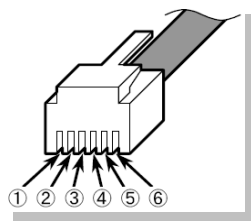
Connect now all inverters with each other via the RJ11 cable.

Insert the plug of the cable into any socket on the first inverter. The other plug of the cable can be inserted into any socket on the second inverter. That's how to connect inverter number 2 with inverter number 3, etc. On the last inverter set the DIP switch for the terminating resistor to position "on".

For the connection of the SolarLog with the first inverter you can use either a prefabricated data cable (accessories not included) or a separate cable manufactured to the following requirements:

Mitsubishi Wiring:

RS485:



RJ11 Pin	SolarLog
3	1
4	4

2.10 Power-One/Aurora

Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions in the Power-One manual.

All inverters from Power-One have the RS485 interface already integrated from the factory. Additionally, each inverter needs a separate communication address assigned to it. It is advisable for the addresses to start at 2 (not 1), i.e. 2, 3, 4, etc. Again, this setting will be carried out on the display. Follow the instructions in the Power-One/Aurora manual

Wiring

The wiring of each inverter is carried out by terminal strips that are placed and located inside the device. Sometimes different interfaces are installed for indoor/outdoor models. The following is a guide to wiring with RS485.

2.10.1 Terminal block - Outdoor - Models:



Connect each inverter with each other as described in the inverter manual with a shielded 3-pin data cable via the RS485 terminal strips. Connect each terminal "+T/R" with terminal "+T/R" to the next inverter and the terminals "T/R" and "RTN".

For the connection of the SolarLog to the first inverter you can use either a prefabricated data cable (accessories not included) or your own cable.

Pull the exposed wires through the cable opening of the inverter and connect them

<u>SolarLog</u>		<u>Terminal strip in the inverter</u>
White	(1)	+T/R
Brown	(4)	-T/R
Green	(3)	RTN

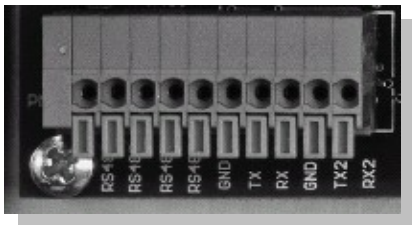
In addition, the terminating resistor on the inverter furthest from the SolarLog must be set. The small switch must be set to position "ON".

2.11 Sunways - AT/NT

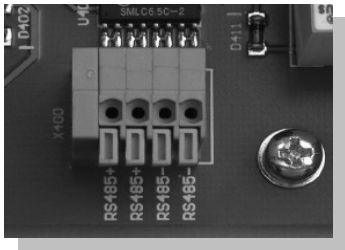
Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions in the Sunways manual.

Make sure that each Sunways-AT/NT inverter has a different internal address configured. Factory default setting is always address 1. The address configuration is described in Sunways manual and can be controlled via the display on the inverter. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, 4, etc.

2.11.1 Terminal strip 750V - Models:



2.11.2 Terminal strip 850V - Models:



Connect each inverter with each other as described in the Sunways manual with a shielded 2-pin data cable via the RS485 terminal strips. There are two RS485 ports, so that the wiring can be passed through.
For the connection of the SolarLog with the first inverter you can use either the prefabricated Sunways data cable (accessories not included) or your own cable.

Pull the exposed wires through the cable opening of the inverter and connect them

SolarLog		Terminal strip in the inverter
White	(1)	RS485+
Brown	(4)	RS485-

The jumper JP must be set on the inverter furthest from the SolarLog, the other inverters shouldn't have this jumper set.

2.12 Vaillant - auroPOWER VPI/1 and VPI (RS485/EIA485)

Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions in the Vaillant manual.

2.12.1 Vaillant - auroPOWER VPI/1

All auroPOWER VPI/1 models have the RS485 interface already integrated from the factory. The interface must be activated through the operating display. Additionally, each inverter needs a separate communication address assigned to it. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, etc. Again, this setting will be carried out via the operating display. Follow the instructions in the Vaillant manual.

2.12.2 Vaillant - auroPOWER VPI

The auroPOWER VPI models were shipped up to the middle of 2005 with an optional RS232 from the factory. To operate with the SolarLog1000 the RS485 option is absolutely necessary. The changing of the interface is possible through the Vaillant company. Please ask your installer about this, or ask Vaillant directly.

Each inverter needs to have a separate communication address assigned to it. For devices with transformer, the assignment of addresses is done via the menu on the inverter. For devices without transformer the assignment is done via a DIP switch inside the inverter. Follow the instructions in the Vaillant manual. It is advisable for the addresses to start at 0, i.e. 0, 1, 2, 3, etc.

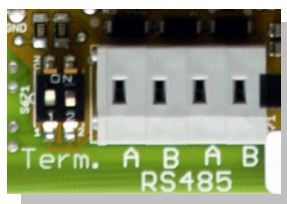
Note: If the RS485 interface is missing on the control board, then it is the RS232 version of the auroPOWER VPI Inverter.

2.12.3 Wiring

The wiring of each inverter is carried out by terminal strips that are placed and located inside the device.

Turn off the electricity or wait till evening (changes made via the display of the VPI/1 models needs to happen during daytime).

Terminal strip – auroPOWER VPI xx00/2 – Models:



Terminal strip – auroPOWER VPI/1 – Models:



Terminal strip – auroPOWER VPI – Models:



Connect each inverter with each other as described in the Vaillant manual with a 2-pin shielded data cable via the RS485 terminal strips. There are two RS485 ports, so that the wiring can be passed through.

Connect each terminal A with terminal A of the next inverter and accordingly with the terminals B.

For the connection of the SolarLog with the first inverter you can use either the prefabricated data cable (accessories not included) or your own cable.

Pull the exposed wires through the cable opening of the inverter and connect them

<u>SolarLog</u>		<u>Terminal strip in the inverter</u>
White	(1)	B
Brown	(4)	A

In addition, a terminating resistor with 330Ohm (enclosed with inverter) needs to set at the terminal strip on the inverter furthest from the SolarLog. The terminating resistor connects the free terminal A with terminal B.

Note: If the cable lengths are kept relatively short, the terminating resistor may be omitted in certain circumstances.

Note: From the generation of VPI xx00/2 onwards, the 330 Ohm resistor, depending on your needs can be switched on via the DIP switch. When delivered, the terminating resistor is switched on. Currently, this applies only to equipment without a transformer.

2.13 Solutronic (RS485/EIA485)

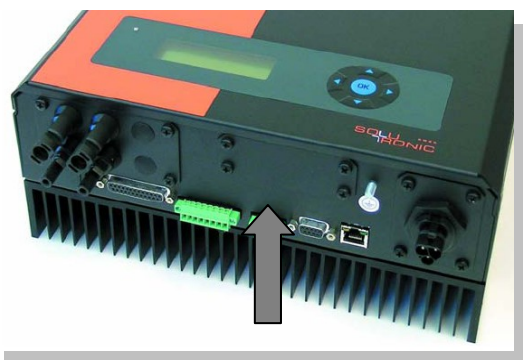
Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions from the Solutronic manual.

*All inverters must be equipped with **Firmware version 1.2.39** or higher. Current firmware versions and instructions for installing are found at www.solutronic.de
The inverters must be **earthed**, otherwise it may cause problems with inverter detection.*

All inverters from Solutronic have the RS485 interface already integrated from the factory (connection plug X2). Additionally, each inverter needs a separate communication address assigned to it. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, etc. This setting will be carried out on the operating display (parameter 230). Furthermore, the parameter 265 from the COM interface on "Protocol 9 - SolarLog" needs to be set. Follow the instructions in the Solutronic manual..

2.13.1 Wiring

Connect the inverter to each other via a 3-pin shielded data cable to the X2 connector on the inverter:



For the connection of the SolarLog with the first inverter you can use either the prefabricated data cable (accessories not included) or your own cable.

SolarLog		Clamping plug on the inverter (in each case from the left)
White	(1)	Pin 1 - RS485-A
Green	(3)	Pin 3 - GND
Brown	(4)	Pin 2 - RS485-B

2.14 Schüco SGI Series (RS485/EIA485)

Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions in the Schüco manual.

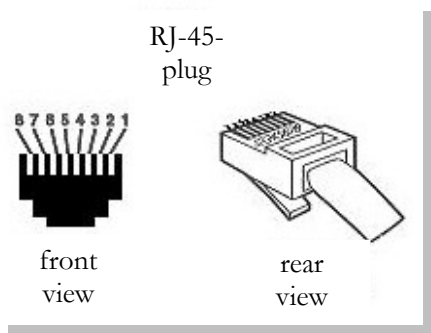
All models have the RS485 interface already integrated from the factory. Each inverter needs to have a separate communication address assigned to it. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, etc. Again, this setting will be carried out via the operating display. Follow the instructions in the Schüco manual.

2.14.1 Wiring

The wiring of each inverter to each other is carried out with conventional network cable, with a RJ45 plug fitted. Schüco uses here special IP65-enabled network plugs that are necessary for outdoors. If the inverter is mounted indoors, you can also use normal network cable.

The attached SolarLog data cable is IP20 and is only suitable for indoor use.

Schüco Pin	SolarLog Pin
(RJ45-plug) (4-pin green plug)	
3 (A)	4
6 (B)	1



Connect all Schüco inverters with each other via normal network cables. At the bottom of the device behind a cover are the two RJ45 connectors for plant communication. Insert the plug of the cable into any socket on the first inverter. The other plug of the cable can be inserted into any socket on the second inverter. That's how to connect inverter number 2 with inverter number 3, etc.

For the connection of the SolarLog with the first inverter you can use either the prefabricated data cable (accessories not included) or your own cable.

Connect the last free jack of the first/last inverter with the data cable that has the RJ45 plug. Attach the terminating plug (IP20!) at the other end. For cable lengths below 100m, the terminating plug isn't really necessary.

2.15 REFUSOL

All inverters must be equipped with firmware version 800.2.20 or higher (viewable in: Menu F1\Numerical list\parameters 1.1 to 1.3). Current firmware versions and instructions for installing are found at www.refu-elektronik.de

All inverters from REFU Electronics have the RS485 interface already integrated from the factory on the underside of the housing (RS485 IN/OUT). Additionally, each inverter has to have the Solarlog type of communication stated and a separate communications address assigned to it. It is advisable for the addresses to start at 1, ie 1, 2, 3, etc. The highest address is 255. These settings can be made on the display of the RUFUSOL device as follows:

- Press F1
 - „Select "Numerical list", press ENTER
 - Set to parameter number 2000 [Password Protection], press ENTER twice
 - Set to parameter number 72555, press ENTER
 - Set to parameter number 0407, press ENTER
 - Select sub-parameter 0407.3, press ENTER
 - Enter the number 2 [Communication type RS485: SolarLog], press ENTER
 - Set to parameter number 0406, press ENTER
 - Select sub-parameter 0406.3, press ENTER
 - Enter Number xx [address] here, press ENTER
- Furthermore, the interface speed needs to be set to 9600 baud:
- Set to parameter number 0420, press ENTER
 - Select sub-parameter 0420.3, press ENTER
 - Enter number 9600, press ENTER

With x2 ESCAPE you get back to the power indicator

*After the specification of parameters on the display, the built-in DC-disconnector switch of the inverter has to be turned off shortly, so that the settings become active. Furthermore, the **date and time** need to be set correctly on the inverter.*

2.15.1 Wiring

Connect each inverter with each other with a shielded 2-pin data cable via the RS485 sockets. There are two RS485 ports with IN/OUT, so that the wiring can be passed through. Each inverter includes "2x 4-pin plugs SACC-M12MS-4SC" packs. Insert a plug into the OUT jack of one inverter (X14B), and the other plug into the IN jack (X15B) of the other inverter.

For the connection of the SolarLog with the first inverter, create a cable with the following description.

Connect the pins on the green 4/6-pin terminal strips of the SolarLog and the 4-pin REFUSOL round pin plug:

SolarLog	REFUSOL
1 (White)	2
4 (Brown)	3

Terminal resistance:

The furthest away inverter from the SolarLog needs an additional "RS485 OUT" REFUSOL rounded plug PIN1 to PIN2 and PIN3 to PIN4 bridged in order to terminate the data bus.

2.16 Kostal Pico / Solar-Fabrik Convert T (RS485/EIA485)

Important note: Never open the casing of the inverter if it is live. Observe strictly the instructions in the Kostal manual.

All inverters from Kostal have the RS485 interface already integrated from the factory, whose connecting terminal is inside the housing. Additionally, each inverter needs a separate communication address assigned to it. It is advisable for the addresses to start at 1, i.e. 1, 2, 3, 4, etc.

Unfortunately, the RS485 address can't be changed directly on screen, but must be configured via the web-server of the inverter. This requires a PC with a network cable connected to the inverter and the IP address needs to be changed via the PC to allow access to the inverter's internal Web-server (The IP address of the inverter is visible on the display).

After entering the IP address, a login window appears. A different User/Password might be needed depending on the manufacturer and software version:

Kostal PICO:

User: PICO

Password: pvwr

Solar-Fabrik Convert:

Old firmware:

User: convert

Password: pvwr

Or new firmware:

User: pvserver

Password: pvwr

More information on connecting the PC and network cable can be found in the manufacturer's documentation.

Kostal Piko:

The procedure is described in the manual „Kom_Anleitung_PIKO_Version_1-21.pdf“ or in „Kom_Anleitung_PIKO_Version_2-0.pdf“.

Solar-Fabrik Convert T-Models:

The procedure is described in the manual

„Montage-_und_Bedienungsanleitung_convert_Netboard__Version_3.1_.pdf“.

The company Solare Datensysteme Ltd. can't supply the documentation because of copyright reasons. You can however download it from the internet homepage of the manufacturer.

2.16.1 Wiring

Connect the inverter to each other via a 3-pin shielded data cable to the 10-pin terminal block of the inverters. The terminal block is located directly beneath the display. Connect each terminal 1, 2 and 3 ("A", "B", "GND") with each other.

10	9	8	7	6	5	4	3	2	1
							GND	B	A

For the connection of the SolarLog with the first inverter you can use either the prefabricated data cable (accessories not included) or your own cable.

<u>SolarLog</u>		<u>Clamping plug on the inverter (in each case from the right)</u>
White	(1)	Clamp 1-A
Green	(3)	Clamp 3-GND
Brown	(4)	Clamp 2-B

2.16.2 Multi-String technology

The Pico / Convert inverters are equipped with several MPP trackers, which means each string input is separately monitored and optimally adapted to the connected modules. The SolarLog can read the data of up to 3 individual strings, which depends on a parallel connection on the inside of the inverter and possibly gets reduced. The SolarLog automatically detects during the inverter input how many strings are active.

■ *For a successful detection of single strings, the inverter has to be feeding in!*

2.17 Mastervolt with (RS485/EIA485)

Note: For the installation it's not necessary to open the casing. All the necessary connection sockets are located on the outside.

All inverters from Mastervolt have the RS485 interface already integrated from the factory on the underside of the housing via RS485 sockets.

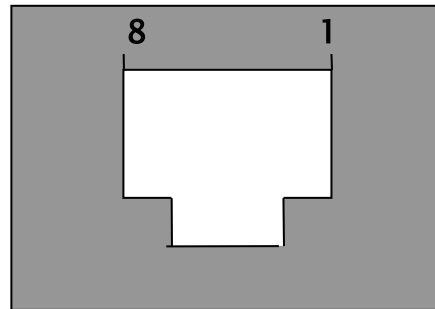
2.17.1 Wiring

Use the RJ45 format for attaching and connecting the RS485 data cable plug to the inverter. These are the same plugs as in conventional network patch cables.

Warning! The SolarLog also has an RJ45 socket. Please under no circumstances connect this socket to the RJ45 socket of the inverter. This could destroy the SolarLog!

Note: We recommend the prefabricated Mastervolt data cable, which is available as an accessory. If the cable is custom-made, then use the following termination circuit:

RJ45 Pin SolarLog RS485



RJ45-plug from the front

4	1
3	4

Then connect all inverters with each other via conventional network cable.

Insert the plug of the cable into any socket on the first inverter. The other plug of the cable can be inserted into any socket on the second inverter. That's how to connect inverter number 2 with inverter number 3, etc.

On the free jack of the first inverter, plug in either the Mastervolt data cable (accessories not included) with the RJ45 connector or the self-assembled cable.

Multi-String technology

The Mastervolt inverters are equipped depending on the model with 1 or 2 MPP trackers, which means each string input is separately monitored and optimally adapted to the connected modules. Also, some inverters can be subdivided internally into 2 or even 3 single inverters. For example the QS6400 can be detected as 2 inverters with 2 strings, a XL15 as 3 independent XL5000s.

The SolarLog automatically detects during the inverter input how many inverters and strings are active.

Important note:

The order which the SolarLog recognizes the inverters at detection is random. It is strongly recommended that immediately after detection, you carry out a reorganization of the inverters in the dialogue "Configuration/Basic/Inverters". The inverters can be identified via the displayed serial number.

2.18 Suntension (Sunville) / Phoenixtec (RS485/EIA485)

Note: For the installation an optional RS485-data card is required, and needs to be installed on each inverter. You don't need to open the inverter, the card can be connected via the underside of the housing and screwed on.

2.18.1 Wiring

The RS485 data card on the inverter has 2x 4 terminal clamps, shown as "R+ R- T- T+'. The inverters are connected with one another one to one through a 4-wire, shielded data cable.

Note: We recommend the prefabricated Sunville data cable, which is available as an accessory. If the cable is custom-made, then use the following termination circuit:

<u>SolarLog RS485-B</u>	<u>RS485 data card</u>	
1	R+	(white)
4	R-	(yellow)
5	T+	(green)
6	T-	(brown)

(Please! observe accurately the T-/T+ on the data card!)

Multi-String technology

The Sunville/Phoenixtec inverters are equipped depending on the model with 1 or 3 MPP trackers, which means each string input is separately monitored and optimally adapted to the connected modules.

The SolarLog automatically detects during the inverter input how many inverters and strings are active.

Important note:

The order which the SolarLog recognizes the inverters at detection is random. It is strongly recommended that immediately after detection, you carry out a reorganization of the inverters in the dialogue "Configuration/Basic/Inverters". The inverters can be identified via the displayed serial number.

2.19 Diehl AKO with RS485/EIA485 interface

Note: For the installation it's not necessary to open the casing. All the necessary connection sockets are located on the outside.

All inverters from Diehl-AKO have the RS485 interface already integrated from the factory on the underside of the housing via RS485 sockets.

2.19.1 Wiring

Use the RJ45 format for attaching and connecting the RS485 data cable plug to the inverter. These are the same plugs as in conventional network patch cables.

Warning! The SolarLog also has an RJ45 socket. Please under no circumstances connect this socket to the RJ45 socket of the inverter. This could destroy the SolarLog!

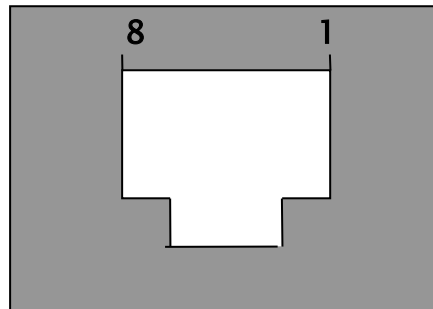
Note: We recommend the prefabricated Diehl AKO data cable, which is available as an accessory. If the cable is custom-made, then use the following termination circuit:

<u>RJ45 Pin</u>	<u>SolarLog RS485</u>
3	1
6	4



Then connect all inverters with each other via conventional network cable.

Insert the plug of the cable into any socket on the first inverter. The other plug of the cable can be inserted into any socket on the second inverter. That's how to connect inverter number 2 with inverter number 3, etc.



RJ45-plug from the front

On the free jack of the first inverter, plug in now either the Diehl AKO data cable (accessories not included) with the RJ45 connector or the self-assembled cable.

Important note:

The order which the SolarLog recognizes the inverters at detection is random. It is strongly recommended that immediately after detection, you carry out a reorganization of the inverters in the dialogue "Configuration/Basic/Inverters". The inverters can be identified via the displayed serial number.

2.20 Connecting SolarLog1000 Analogue Modem Package

The analogue modem is available in two versions:

1. Analogue Modem Home
2. Analogue Modem Industry

Prerequisite for the operation of the modem is an analogue phone line. This is also usually part of any ISDN technology, available via the ISDN telephone system. Please check that you can still make a phone call through the line being used. For the data connection to the Internet, the SolarLog uses a Internet-By-Call connection. Some telephone systems are equipped with locks to prevent this dial-up happening.

If the dial-up function of the SolarLog1000 is to be used, the corresponding telephone number on the telephone socket being used needs to be assigned.

Check if the connection works with a normal telephone. Make an outside call and have someone call you too.

2.20.1 Included in delivery: SolarLog1000 Modem Package

- RS232 serial cable
- Telephone connection cable
- Power adapter

Connecting to the SolarLog1000 is very easy:

1. Connect the modem via the RS232 serial cable to the RS232 port on the SolarLog
2. Connect the modem to the telephone cable and plug the cable into the phone TAE jack
3. Plug in the power adapter and turn on the modem

All other settings can be configured on the SolarLog display. A PC isn't needed.

2.21 Connecting the SolarLog1000 Mobile Package

The Mobile package connects the SolarLog1000 with the internet over a mobile phone network. Additionally to the Mobile Package, you also need a SIM Card from your choice of mobile phone providers (not included).

2.21.1 Included in delivery: SolarLog1000 Mobile Package

- Mobile Modem GPRS
 - RS232 serial cable
 - Power adapter
 - external antenna with 2m connection cable
- (a DIN rail is available optionally as an accessory)

Connection to SolarLog1000

1. Insert the SIM card into the modem. Press hard with a sharp object on the yellow eject button on the side of the modem.
2. Screw the external antenna onto the modem. Find a suitable place where the antenna (with magnetic foot) has a good reception. Possibly check the reception with a normal mobile phone first. A good reception is important for a reliable data connection.
3. Connect the modem via the RS232 serial cable to the SolarLog1000
4. Plug the RJ11 plug of the power supply into the modem

All other settings can be configured on the SolarLog display. A PC isn't needed.

2.22 Connecting the MT Sensor Box

The SolarLog1000 is thanks to the MT Sensor Box (optional accessory) capable of collecting and storing environmental data. The environmental data include:

- Radiation sensor
- Module temperature

- Ambient temperature (optional, sensor accessories)
- Wind speed (optional, sensor accessories)

This data delivers important key values for yield control and further evaluation/analysis.

The SolarLog radiation sensor is equipped with a high quality mono-crystalline cell, rugged and designed for permanent use outdoors (IP65). All components are just screwed on, so that the assembly can be carried out very quickly. All cables are UV and weather resistant.

Warning: The opening of the sensor is not necessary and would lead to a loss of guarantee.

Currently a maximum of 1 Sensor Box can be attached to the SolarLog1000.

The connection of the Sensor Box to the SolarLog1000 happens via a free RS485 interface, which can be accessed via the display (Dialogue Config/Initial configuration/Start) and needs to be set to the "MT Sensor" interface type.

2.22.1 Assembly

Sensor:

The radiation sensor must be fixed parallel, i.e. the same orientation and inclination of the modules on the mounting bolts attached to a mounting rail. The location should be chosen so that preferably no shading happens.

Module temperature

The module temperature is controlled by an integrated cell-temperature sensor, so that a more complex assembly on the back of the module isn't necessary.

Outside temperature (optional):

The outside temperature sensor is screwed into the radiation sensor (3pin connection). Screw on tight. Mount the sensor in a shady place with the wall-mount brackets. The cable must not be extended.

Wind Speed Sensor (optional):

The wind sensor is screwed into the radiation sensor (2pin connection). Screw on tight. The wind wheel needs to be fixed above the assembly bracket in a more exposed position. The cable must not be extended.

2.22.2 Wiring

The connecting cable is 4-wire one and includes the 12V power supply and data line to the SolarLog. No separate power adapter is required. The power cable may be extended (max. 100m), but it must have the supply voltage of 12V at the end of the cable line. Outdoors, the cable connection needs to be protected accordingly and done a minimum IP54 protection. Note: penetrating moisture/wetness can cause a short circuit and destroy the Sensor Box and SolarLog.

The 4-wires of the connecting cable should be connected with the green 4-pin plug on the SolarLog (allocation is on the backside of the Sensor):

The wiring is as follows:

<u>RS485 SolarLog</u>	<u>Sensor Box</u>	
1 (Data+)	Data+ A	(brown)
2 (+12V)	+12V	(red)
3 (GND)	GND	(black)
4 (Data-)	Data- B	(yellow)

The shielding needs to be connected to a potential equalisation.

2.22.3 Initial startup

When the SolarLog1000 is switched on, the Sensor Box also receives electricity. Afterwards, the Sensor Box needs to be configured to the desired free RS485 interface. That can be done through the display dialogue (Config/Start Config/Start where you can select the "MT Sensor").

The Sensor Box can be then via the display dialogue "Inverter Detection" integrated into the system, just like any normal inverter can be too.

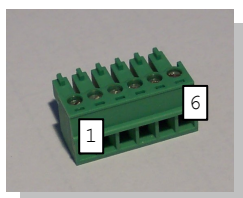
2.23 Connecting external electricity meters

An external electricity meter can be connected to the SolarLog1000 via the S0-input. An external three-phase electricity meter of the whole plant can give an exact reference measurement for example when a solar plant is owned by more than one party, giving accurate interval billing possibilities.

The electricity meter is listed as a virtual inverter on the SolarLog1000. The pulses are placed in a momentary power value (Pac) and the total income is offset.

Therefore, the SolarLog1000 is capable of monitoring a plant without further connections to inverters. Especially then, when the installed inverter data protocol is not supported yet. Together with the radiation sensor from the Sensor Box, the SolarLog can be used as a monitoring device for such installations.

The S0 port on the external electricity meter needs to be connected to the 6-pin S0 In/Out plugs as follows:



SolarLog		S0
1		S0+
2		S0-
3	bridged	
4		
5	unused	
6	unused	

The cable length between the electricity meter and SolarLog1000 should not exceed 10m.

The pulse factor is set at 1000 pulses/kWh per default, but can be changed on the SolarLog display in the dialogue "Config/Basic/Inverters" on inverter 1.

2.24 Attaching large displays

There are basically 2 different ways to attach large displays to the SolarLog1000:

1. Via RS485
2. Through S0 pulse output

Generally, the RS485 port should be used if the choice exists. The RS485 cable lengths usually go up to 1000m and the data can be displayed on the SolarLog1000.

The current feed performance can be read through the SO output as a pulse string. The display must calculate the performance and overall yield by itself.

2.25 RS485/EIA485 wiring

If the RS485 connection is used, one has to take into account that the interface is already in use by the inverter. The display in general can be looped into the same RS485 line. Basically: As soon as the RS422 interface is being used (Fronius/Phoenixtec/Sunville) no display can be connected.

Note: Generally, the manufacturer's specifications need to be followed. If the display is looped into the same line as the inverters, then the display needs to have the interface parameters set accordingly. Please contact the manufacturer of the display to do this.

Schneider-Display Technology:

3-pin Control cable, 3x 0,5mm ²	
<u>Display</u>	<u>SolarLog RS485-A/B</u>
brown - A	1
	2 (unused)
grey-GND	3
blue-B	4

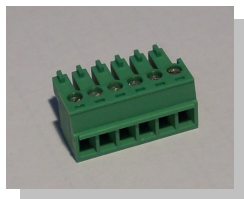
RiCo Electronic:

To attach the RiCo display via RS485 to the SolarLog, the terminal block 3, Pin 1 and 2 must be connected. More detailed information available in the manual of the display.

2-pin Control cable, 2x 0,5mm ²	
<u>Display</u>	<u>SolarLog RS485-A/B</u>
Pin1: Data+	1
	2 (unused)
	3 (unused)
Pin2: Data-	4

2.26 S0 output wiring

The S0-output can be configured and used in various ways, depending on the wiring of the 6-pin clamp plug.



2.26.1 Current controlled S0 output

(e.g. Displays from Schneider Display Technology)

Requires a 2-pin shielded cable, 2x 0,6mm², max. length 100 meters

Observe strictly the manufacturer's data of the display manufacturer.

Display	SolarLog S0 In/Out	
S0+	4	bridged
S0-	5	
	6	

2.26.2 Contact controlled S0 output

(e.g. Displays from RiCo Electronic)

Requires a 2-pin shielded cable, 2x 0,6mm², max. length 100 meters

Observe strictly the manufacturer's data of the display manufacturer.

Display	SolarLog S0 In/Out
S0-	6
S0+	5

2.26.3 Pulse factor

The SolarLog1000 is set by default to 1000 pulses/kWh on the SO output. This value can be changed on the SolarLog display under the dialogue "System/Large display". The pulse factor needs to be configured in conjunction with the plant size (kWp).

Plant size kWp	Pulse factor
30 kWp	2000
60 kWp	1000
100 kWp	600

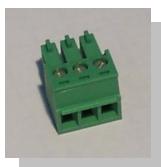
150 kWp	400
300 kWp	200
600 kWp	100

Please note that the impulse factor on the SolarLog and the display need to be identical.

2.27 Connecting Relays

The SolarLog1000 has a potential-free control relay which can be switched on in the event of an alarm or failure. It may be charged with a **maximum** of 24Volt and 5 amps, so that a 220Volt load can't be directly connected but rather through another load relay.

The cabling is via a 3-pin connection plug:



In OFF-state are:

Pin 1-2 open

Pin 2-3 closed

In the ON state (alert/failure active) are:

Pin 1-2 closed

Pin 2-3 open

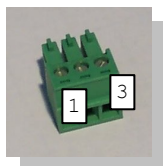
Typically, PIN1 and PIN2 are used to connect the load relay.

Through the SolarLog display in the dialogue "Config/Advanced/Anti-theft device", you can easily test the relay.

2.28 Connecting Alarm contacts

The SolarLog1000 has an alarm contact that triggers when the connection is broken. For the wiring on the mounting-rail, a weather-resistant, thin cable should be used, that rips under strain. The maximum cable length is 1000 meters.

The connection is via a 3-pin connecting plug:



PIN1 and PIN3 must be connected. If the connection is interrupted, the alarm triggers, which can send a message via the relay an email or SMS.

The SolarLog can test and configure the Alarm feature via the display in the dialogue "Config/Advanced/Anti-theft device".

2.29 Connection to a PC / Network

The SolarLog1000 is equipped with a standard Ethernet RJ45 network jack, meaning any standard network cable can be connected to it. Speeds of 10Mbit and 100Mbit are supported.

Generally, any PC network technology can be used to connect the SolarLog1000.. The following technology is available:

1. Direct Cable Connection
2. Connection via a network router
3. Connection through the mains power (PowerLine)
4. Connection via wireless (WLAN / GSM)

Connect the SolarLog1000 now via the Ethernet RJ45 network cable with your network card on your PC or if available with your network router.

Please note that for a direct connection of the SolarLog1000 to PC a so-called "Crossover" (twisted) network cable needs to be used.

If using the SolarLog PowerLine package, you can connect the SolarLog via the network cable supplied with the PowerLine plug. Then connect the PC / switch or internet router via the second PowerLine plug. The two PowerLine plugs will connect automatically with each other and serve as a "Network cable via the mains power line". The PowerLine plugs should not be connected via a multiple power socket, as other power supplies would disrupt the data quality.

The IP address of the SolarLog can be comfortably configured via the display. This process is described in the chapter "startup" in the user manual.

3 Manual

Once all the cables and accessories has been connected to the SolarLog1000, the unit can be put into operation, i.e. the configuration can now be carried out.

The SolarLog500 is designed so that the initial configuration can be done without a PC directly on the screen. Additional settings can be carried out via PC.

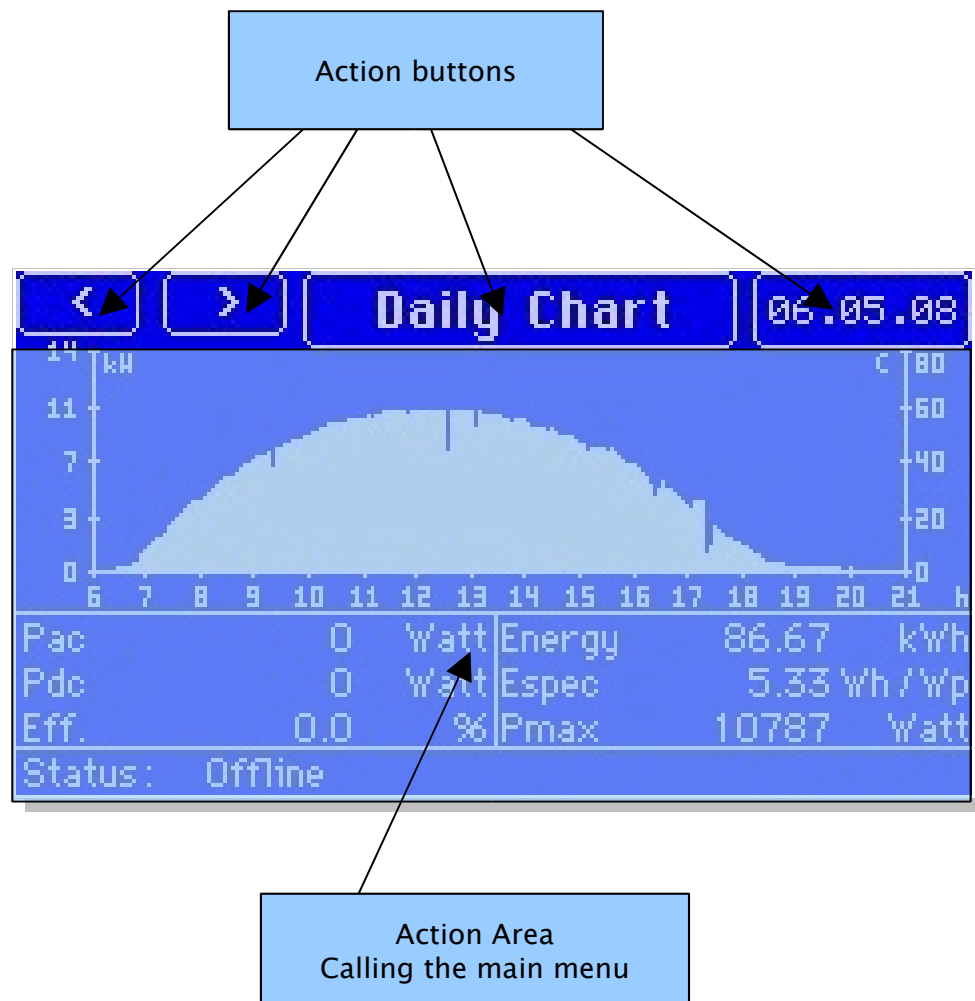
startup is particularly easy since all important settings are automatically done one after the other. Further configuration can still be done later on. Of course, all settings made at the beginning can be changed later on.

3.1 Touchscreen Display

The SolarLog1000 can be operated comfortably via the built-in Touchscreen. Touchscreen means that just like the mouse arrow on a typical PC, you can use your finger on the screen to select things. You just have to "point" with the finger to go to the desired function and select it. The pressure applied to the screen isn't important. Just press lightly with the tip of your finger on the desired position or button. If the SolarLog doesn't respond immediately, wait a few seconds and try again. Under no circumstances press harder on the screen.

Important note: Using a hard sharp object can break the glass area and lead to a loss of guarantee.

The display has touch points everywhere, which means the controls can be spread out everywhere throughout the display. The following image shows an example of where actions can be triggered.

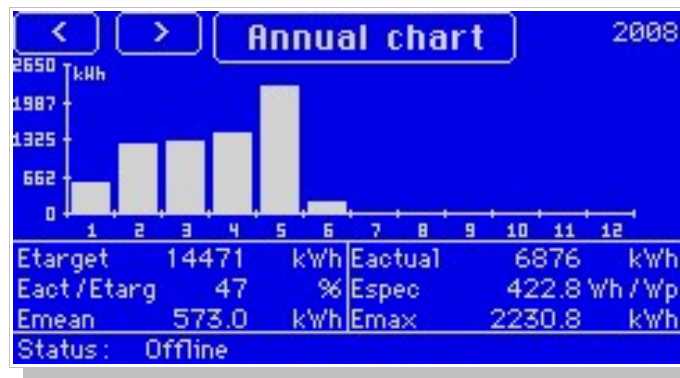


- Action buttons
Different functions can be called upon, which depending on the dialogue will be different.
- Action Area
Through pressure on the surface, the main menu will be called up where you can then switch to other dialogues.

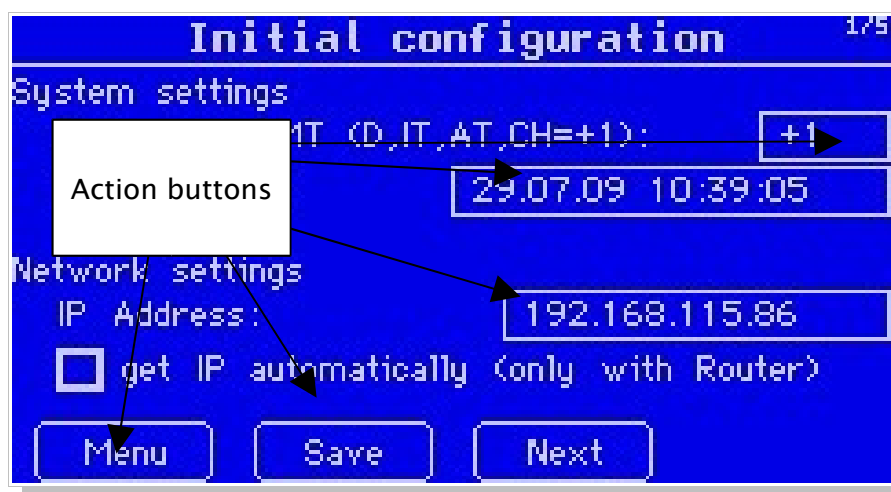
There are generally two types of dialogues:

- Graphic dialogue (like above)
- Text dialogue

Graphic dialogues usually have special functions, sometimes even "hidden" areas of action areas which can't be seen. For example, if you press on a 'Year' while viewing a bar chart of the "Total Graphic dialogue", you can jump to the individual year's graphic. The bar itself is therefore an action area.

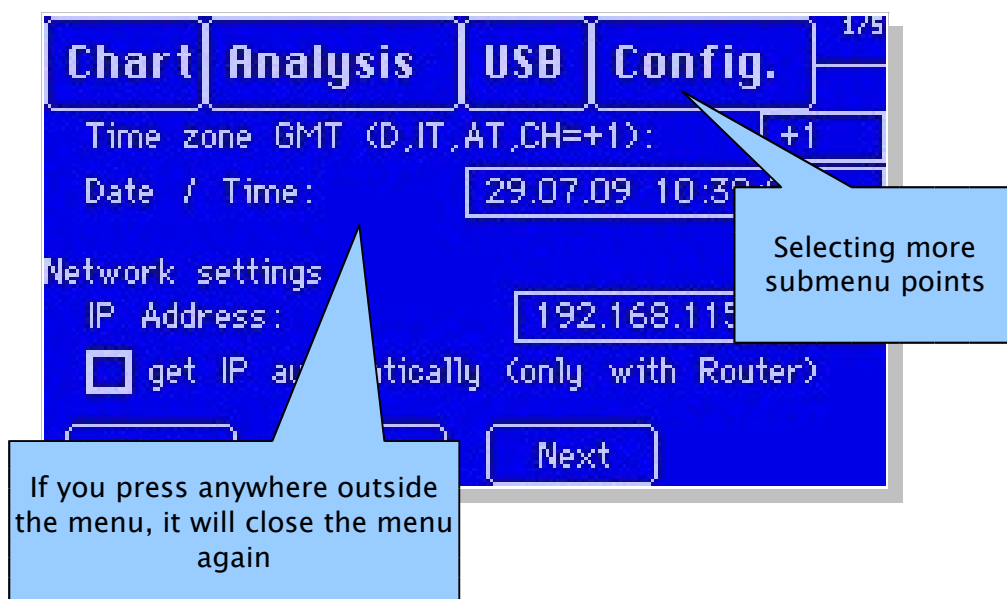


Text dialogues usually serve as configuration dialogues. In these dialogues, there are no action areas, but only action buttons:



Text dialogues have always got one or more action buttons on the bottom edge of the display. The left button is always "Menu", the other buttons vary depending on the dialogue. The "next" button leads you further into sub-dialogues. The number of sub-dialogues if at all can be seen on the top right of the screen.

The main menu appears at the upper edge of the display:



By pressing the individual menu points, the further sub-menu points are then accessed. Pressing anywhere outside of the menu buttons will close the menu again.

Text entries via the Touchscreen are made on a so-called "virtual keyboard":



The virtual keyboard if needed appears on the display and you can carry out appropriate entries just like a normal keyboard. Depending on the type of entry, a numeric keypad or a full alphanumeric keyboard will be shown.

3.1.1 Menu Structure Touchscreen Display

The following menu structure gives an overview of the available dialogues on the Touchscreen display:

Level 1	Level 2	Level 3
Graphic	Overview	
	Day	
	Month	
	Year	
	Total	
	Large display	
Diagnosis	Messages	
	Inverter activity log	
	Alarm contact (anti-theft)	
USB	Copy data	
	Data backup	Copy all data
		Input yield data
		Input configuration
	Firmware Update	
Configuration	Start	Initial configuration
		Inverter detection
	Basis	Network
		Plant groups
		Inverter
		Forecast
	Internet	Basic settings
		email/SMS
		Homepage
	Advanced	Plant monitoring
		Large display
		Alarm contact (anti-theft)
		Inverter status monitoring
		RS485/EIA485 wireless package
	Internal	Data correction
		System
		Firmware
		Language settings

3.2 PC display

To operate the SolarLog on the PC, you don't need additional software to be installed. The SolarLog has an integrated web server which contains all the software necessary. All evaluations and graphical configurations can easily be done on the PC, you only need a web browser.

For operation via web browser, a network connection between the PC and SolarLog1000 is necessary. The network configuration must first be carried out on the text display.

It is recommended to use the internet browser "Mozilla Firefox" which is available on all major operating systems.

Generally though, any internet browser can be used. Please activate "Javascript" for use with the SolarLog1000.

To call up the main dialogue on SolarLog1000, start your internet browser and enter the network address.

3.2.1 Menu structure PC display

Level 1	Level 2	Level 3
Yield data	PC Visualization	
	Palm / Pocket PC	
Diagnosis	Event log	
	Degradation	
Configuration	Basis	LAN
		Plant groups
		Inverters order
		Inverter
		Forecast
		Graphic
	Advanced	Internet
		email
		SMS
		Export
		Fault
	Internal	Backup
		System
		Update

3.3 Initial startup

Once all the cables and accessories has been connected to the SolarLog1000, the unit can be put into operation, i.e. the configuration can now be carried out.

The SolarLog1000 is designed so that the initial configuration can be done without a PC directly on the display.

However, there are dialogues which are only available via the display (for example inverter detection), or only via a web browser on a PC (for example sorting the display order of the inverters).

Generally, we recommend configuration directly on the display, though dependant on plant size and knowledge level of the installer, the operation via PC could be easier and possibly faster.

startup is very easy, as all the important dialogues and settings are dealt with automatically one after the other. Further configuration can still be done later on. Of course, all settings made at the beginning can be changed later on.

Generally, the startup is divided up as follows:

1.Start configuration

1.Inverter manufacturer details

2.Inverter detection

2.Configuration of the inverters (only connected module performance)

3.Internet configuration (if necessary)

1.Configuration of the Internet access (DSL, modem, wireless)

2.Details of homepage site-access data

3.Test Internet access

4.Other functions (if necessary)

1.Alarm functions

2.Large display

The vast majority of settings are already preconfigured on the SolarLog and don't need to be changed.

3.3.1 Start configuration

Start first with the details in the "Start configuration":

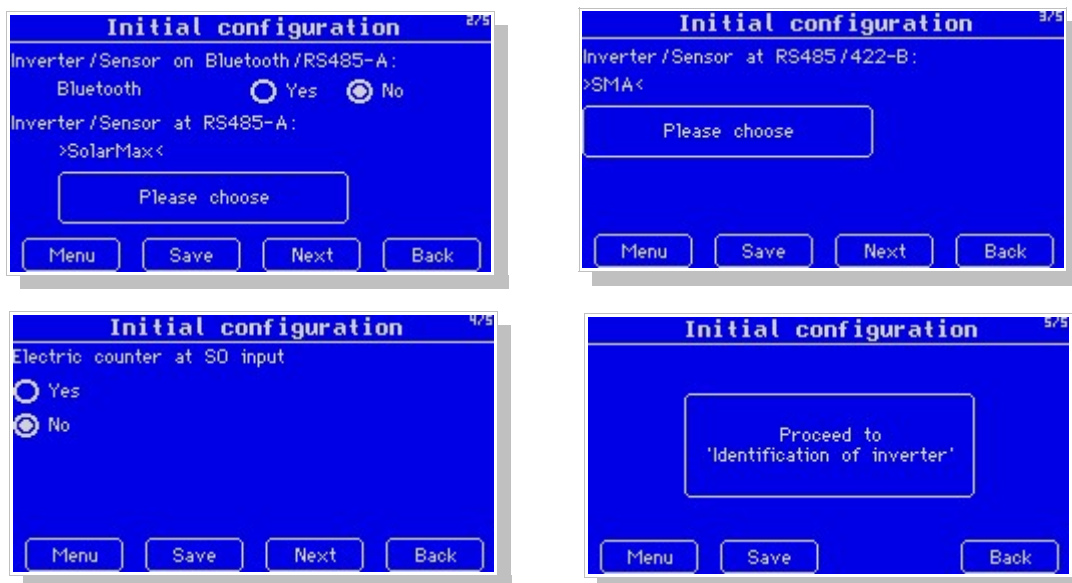
Select "Config" in the main menu. /Start/Start configuration. This dialogue contains the most important settings like date and time, network address, as well as the inverters in use.



Please check the date and time. The SolarLog1000 contains a supporting-capacitor that can buffer the time set at the factory over a long period of time. However, the date and time should be corrected if necessary. The IP address of the SolarLog is also already set, so as to allow faster

access per PC onto the SolarLog. The address can also be configured later, see chapter "Connecting to the PC/Network". If the SolarLog is attached to an Internet router, the network address will be set automatically.

In the next 3 dialogues, the attached inverters can be configured. For every interface type, i.e. RS485-A, RS485/422-B and S0 input, the corresponding inverter manufacturers are displayed. Identical OEM devices are selected according to the original manufacturer, as the data telegrams are generally identical.



Finally, you can spring directly into the dialogue "Inverter detection".

Bluetooth option:

The SolarLog1000 can be factory ordered with the Bluetooth Option so that certain inverter models from SMA can be attached via Bluetooth. In this case the appropriate selection appears at the Start configuration in dialogue "2/5". If Bluetooth is selected, then "SMA" is automatically preset.

Warning: The use of the Bluetooth interface automatically disables the RS485-A interface. Only RS485-B can be used additionally.

3.3.2 Inverter detection

The Inverter detection scans all active interfaces, to identify the amount and type if necessary of inverters attached. The detection may take some time, especially with SMA and Sputnik/SolarMax. The display however shows the status and the number of identified inverters. By clicking the "Finish" button, the scan can be shortened if all inverters are already detected.

Note: The maximum number of 100 inverters per SolarLog depends on the length of data cable and on the inverter manufacturers being used. SMA allow for example a maximum of 50 inverters per interface, Kaco allows the addressing of 32 inverters on a single interface.

If the inverter configuration is changed later on, the inverter detection has also to be repeated. The SolarLog automatically recognizes that a post-detection is required and formats the existing data accordingly. This process may take a long time, depending on the existing data and number of inverters. During this time, the SolarLog shouldn't be interrupted or shut down, as a loss of data would result. Therefore it is generally recommended before a post-detection is carried out, that a full data backup is carried out onto a USB stick or via the Web browser onto a hard drive. Check after detection the number of inverters. If not all inverters were detected, please check the wiring and settings on the inverters. Depending on the manufacturer there needs to be a change in the address number or the RS485 interface needs to be activated on the inverter. Once you have identified the inverter, the SolarLog begins immediately with data recording. There are no restrictions regarding data recording and configuration. The SolarLog offers you to continue with the configuration of the inverters, which is also recommended.

3.3.3 Inverter Configuration

The inverter configuration appears at first to be very extensive. However, only the attached generator power details need to be modified, all other parameters for monitoring exist already with meaningful default values and can therefore normally be left unchanged. Also the Sensor Box and the S0 input is configured as an inverter. Here some special details are necessary, which are accessible via the "Next" button.

Depending on the inverter manufacturer and type of inverter, the input values can vary.

Number	Here, additional inverters can be selected from a list.
New number	(Only visible for certain inverter manufacturers) Since SMA and Danfoss inverters have no address number adjustable via the inverter display, the inverters are sorted according to their serial numbers, which is more or less randomly done, and may not correspond to the addressing desired. Therefore, the current position can be changed to another one. Note: It is recommended to carry out this change immediately after inverter detection, since already logged data can not be transferred to the new position. If a larger number of inverters needs to be reordered, the dialogue "Inverter order" via the web interface on the PC should be used.
Device name/serial number	Differs depending on the inverter manufacturer.
Product label	Here any label can be chosen, which is shown on the display dialogue or on the PC.

In dialogue 2, the connected module performance can be entered. Depending on the type of the inverter, the total performance or the string performance can be configured. Please enter the exact performance data here without errors, since these values are used to monitor the plant performance.

Module field	Via the Module field number, you can order together similar strings/inverters. Only strings/inverters with the same module field number are compared against each other during the plant monitoring. Example: 4 inverters aligned East connected and 3 inverters on modules aligned West. The module field number The "East Inverter" should now be "1" and the "West inverter" should be "2". These parameters are important for performance comparison of the inverters to each other.
Connected module power	Here, for every inverter or string (only for Multi-String inverters), the module's exact power total must be specified. At 28 x 160 Watt modules = 4480
Product label	The String name, which appears on the homepage or PC (only for Multi-String inverters)

In Dialogue 3 and the following dialogues, the data for the system monitoring is configured. The SolarLog already has useful predefined values preset, so that nothing needs to be changed here at the startup phase.

You should therefore press "Save". Then configure all the inverters one after the other in order as described above.

This completes the normal setup of the inverter. The SolarLog now records the data of the inverter and monitors the plant.

3.4 Display menu navigation

Operating the SolarLog via the display happens through many dialogues, which can be selected via the main menu. During the development of the SolarLog, a lot of value was placed on being able to completely operate and configure the SolarLog without the use of a PC.

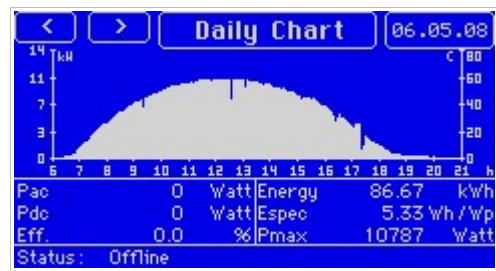
3.4.1 Graphic

3.4.1.1 Overview



This dialogue provides an overview of the date, time, detected inverters and accessories, as well as the current day/total values and CO₂ savings.

3.4.1.2 Day graphic



The day graphic show the performance values (P_{ac}) of the inverter as a curve. The scaling of the y-axis calculates automatically from the total of the displayed inverters. The hours displayed on the x-axis can be configured separately for every month.

Below that the legend shows the most important parameters as a numerical value:

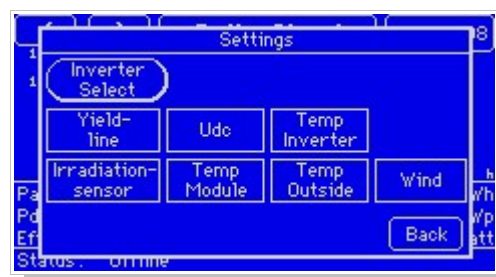
Pac	Current feed-in power (P_{ac})
Pdc	Current module power (P_{dc})
Efficiency	Efficiency according to the formulae $P_{ac}/P_{dc} \times 100$
Energy	Accumulated Days Yield in kWh
Specific Yield	Specific energy = Day Yield kWh / Plant size kWp
Pmax	Highest reached performance value in 5-minute averaged values

The status displays the current inverter status and error codes. Inverters with the same status are grouped together. The status and error text is manufacturer specific and should be in the manufacturer's user manual. The status "MPP" means "Maximum Power Point" and means that electricity is being fed in.

"Offline" means that the inverters are in night-time mode, so are off.

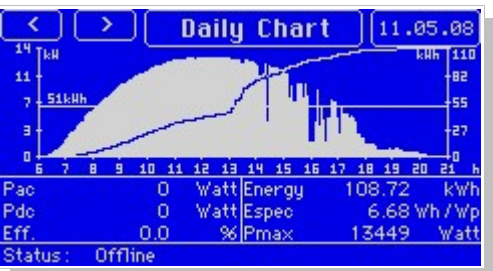
By using the buttons at the top of the screen, you can browse the day's date using "previous or next". Pressing on the date always changes you to the present day. Pressing on the bottom screen area opens the main menu.

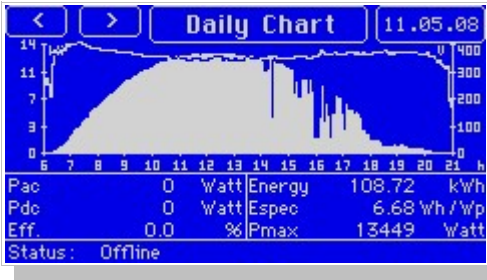
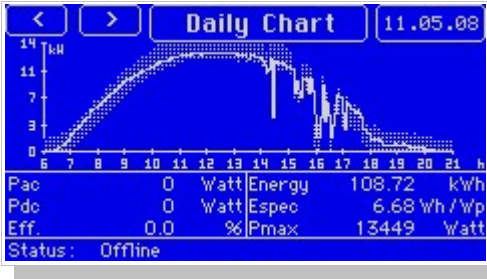
Pressing the middle button "Day graphic" opens a submenu:

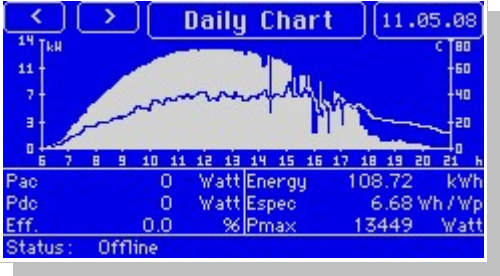


Via this submenu, further options are available. The options that appear depend on whether a Sensor Box is attached or not. The selection boxes in the rectangle fields are parameters, which additionally to the power curve can be shown on a second y-axis. Only 1 parameter can be selec-

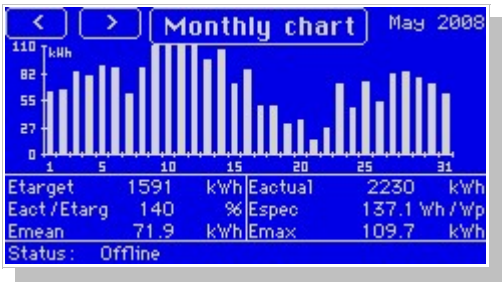
ted, otherwise the overview gets lost (several parameters in the web view can also be displayed in colour).

Inverter selection	To select the inverters in the day view, you can select and control them here. Every inverter selected or deselected, or "All inverters" selects all inverters at once.  In this example, the inverters 2, 3, 6 and 7 have been selected for the calculation of the graphic and the legend. If groups have been defined, then the groups appear first and then the next step leads to the selection of the inverters inside the groups.  Using this technique, you have access to all or only a certain selection of inverters.
Yield line	A yield line appears in the graphic together with the day's target value. 
Udc	Here the DC voltage history is shown. If several or all inverters in the plant are selected, the averaged voltage line is shown.

		
Temp. Inverter		Here the inside temperature of the inverter is displayed. Not all inverters deliver these data values (for example SMA and Fronius don't)
Sun sensor	Radiation	The Sun radiation sensor provides a standard reference value for current sunlight. The value is directly comparable to the plant DC power converted to 1kWh/kWp. The graphic shows the reference value as a hatched area, within which the actual DC power should be at.  In the example we see that the DC power before noon was below the possible theoretical performance. In this case, it's due to shading, it's not always a fault or a defect at the plant.
Temp. Module		The module temperature is an important parameter regarding module efficiency.

	
Temp. Outside	
Wind	The outside temperature is an optional sensor, which is available as an accessory to the Sensor Box.

3.4.1.3 Month graphic



The month's graphic shows the daily values. Again here, the y-scaling is automatically calculated from the selected inverters.

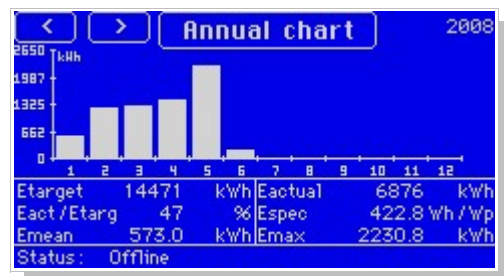
You can navigate like the day graphic with the buttons at the top of the screen. The choice and selection of the inverter can be done via the "Month's graphic" button.

If one day's bar is clicked, it will change to the corresponding date's day graphic. Because the bars are relatively thin, you sometimes hit the wrong day, but you can quickly change that to the correct day with the "Previous/Next" buttons.

The legend shows the main parameters as a numerical value:

Yield target	The SolarLog calculates for every month a target yield, that in turn determines the year's desired yield/earnings.
Actual yield/Target yield	Displays the generated target/actual yield in percent
Average yield	The average of all days in the month
Actual yield	The actual month's yield in kWh
Specific Yield	Specific energy = Month's yield kWh/Plant size kWp
Maximum yield	Highest day's yield in the month

3.4.1.4 Year graphic



The year's graphic shows the monthly values. Again here, the y-scaling is automatically calculated from the selected inverters.

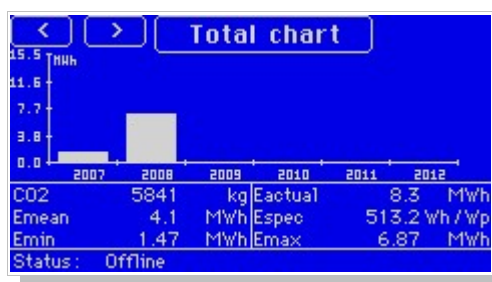
You can navigate like the day graphic with the buttons at the top of the screen. The choice and selection of the inverter can be done via the "Year's graphic" button.

If one month's bar is clicked, it will change to the corresponding date's month graphic.

The legend shows the main parameters as a numerical value:

Yield target	The annual target value is determined by the year's desired yield via the dialogue "Forecast"
Actual yield/Target yield	Displays the generated target/actual yield in percent
Average yield	The average of all months in the year
Actual yield	The actual year's yield in kWh
Specific Yield	Specific energy = Year's Yield kWh / Plant size kWp
Maximum yield	Highest month's yield in the year

3.4.1.5 Total graphic



The overall graphic shows the stored yearly values. A total of up to 6 years can be shown within one graphic. From 7 years onwards, you can browse via the previous/next button to other years. You can navigate like the day graphic with the buttons at the top of the screen. The choice and selection of the inverters can be done via the "Total graphic" button.

If one year's bar is clicked, it will change to the corresponding year's graphic.

The legend shows the main parameters as a numerical value:

CO2	The total CO3 value saved
Average yield	The average value of all years
Minimum yield	Lowest annual yield
Actual yield	The total yield
Specific Yield	Specific energy = Total yield kWh / Plant size kWp
Maximum yield	Highest year's yield

3.4.2 Diagnosis

Under diagnosis you can query in detail the plant's condition.

3.4.2.1 Messages



The SolarLog generates messages depending on configuration for errors and faults, or just to give you the current day's yield. Each message can be sent as an email or SMS. In addition, all messages are stored temporarily in memory and are available on the display for retrieval. The last 50 messages can be retrieved. Furthermore **calling the messages list** acknowledges/ confirms the pulled **relay**, which is connected into the plant monitoring. Example:

It's part of the inverter configuration, that an inverter breakdown activates the relay. If an inverter breaks down now, the relay trips. It remains tripped until you pull up the dialogue "Messages". This acknowledges/confirmes the error, so to speak.

Since all messages are usually sent per email, the corresponding message is also stored in the messages list. That gives you the ability later on, to find out the reason why the relay was tripped.

The messages list saves:

- Date and time of the incident
- Incident type The following incident types:
"Day's income", "Performance monitoring", Inverter status/faults", "Inverter offline", "Alarm contact"
- Message type "email", "SMS" or "---" (nothing sent)
- Delivery status.
„OK“ Sent
„#x“ x = Number of failed transfer attempts. After 4 attempts appears "NOK"

3.4.2.2 Inverters event log



Event records			1/23
03.06.08	11:24:45	Stat: Offline	
03.06.08	06:01:08 ~ 11:24:44	Stat: Hpp	
03.06.08	05:57:50 ~ 06:01:07	Stat: Netzeub.	
03.06.08	05:56:45 ~ 05:57:49	Stat: Rize	
03.06.08	05:56:23 ~ 05:56:44	Stat: Warten	
03.06.08	05:46:57 ~ 05:56:22	Stat: Netzeub.	
03.06.08	05:45:00 ~ 05:46:56	Stat: Offret	
03.06.08	05:44:17 ~ 05:44:59	Stat: Stop	
02.06.08	18:48:48 ~ 05:44:16	Stat: Offline	

Back

The event log records all status changes to the inverter in a separate protocol. Every 15 seconds (depending on the number and type of the inverter sometimes even longer), the status and error codes are read from the inverters. If there's a change, it gets saved in the log. Every inverter has 200 memory slots available. The current status is always at the very top of the list in dialogue Page 1.

If an error occurs, then the text "Err" blinks. Some inverter manufacturers do not provide extra error codes in their data telegrams, here the errors are "packed" as status code. In this case, no "Err" is displayed.

Error codes are per default so configured in the plant monitoring, that an email gets sent. Therefore, critical messages also appear in the dialogue "Diagnose/messages".

3.4.2.3 Alarm contact (anti-theft)



The SolarLog1000 constantly monitors its internal alarm contact. Once this has been interrupted the alarm is triggered. What happens here can be configured in the dialogue "Config/Advanced/Alarm contact" (notification by email/SMS/relay).

Once the alarm has triggered, it remains active for a maximum of 20 minutes, then it automatically gets cleared. You can manually clear the alarm at any time or even completely reset it. You should only carry out a reset, if the cause of the alarm has been dealt with, otherwise it will trigger immediately afterwards again.

3.4.3 USB

The SolarLog contains a USB interface, which every USB compatible USB stick can be connected. The maximum memory size shouldn't exceed 2GByte.

Note: A PC can't be connected to this USB interface.

3.4.3.1 Copy data



Here you can copy all data from the SolarLog to a USB stick. The unique thing about it is, you can view all the data offline on a PC afterwards, i.e. without a direct network connection you can view the data. The visualization is done using the Web browser, no software has to be installed on the PC

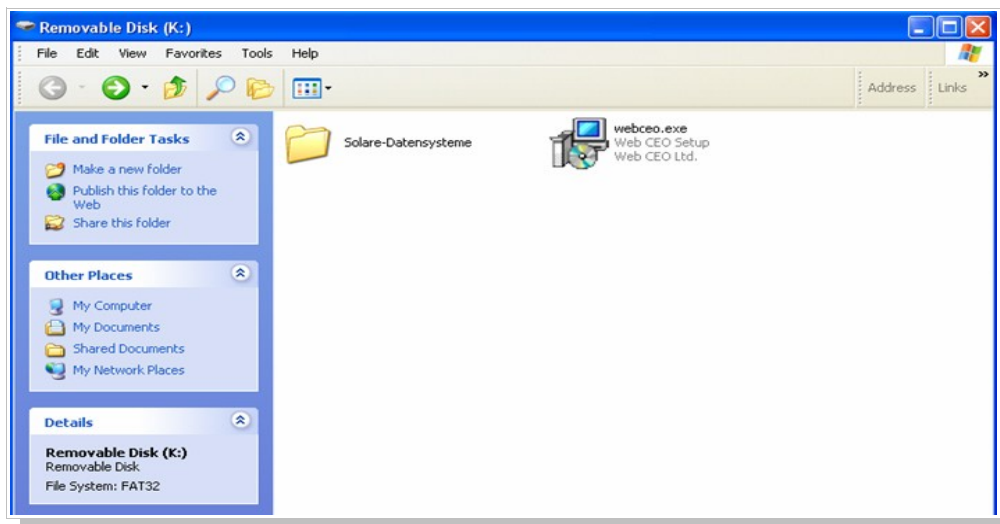
Copying the data always gives you the data for the day curves of the last 31 days. If a complete record is desired, you should copy at least once this time period onto the USB stick. The old data of course will be kept. A USB stick with 512 MB memory is sufficient for many years of data storage.

After saving the data, the USB stick can be plugged into the PC. After a brief pause, a window will automatically open under Windows.



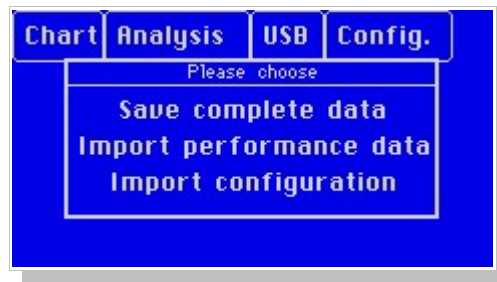
Please select "Open folder, to see files".

If no window opens, then open the file manager "Explorer" and select the USB stick drive.



There you will see the file "index.htm" and also the folder "SL1000" which contains all the data. Please double-click or open the "index.htm". This opens the visualization, which is described on page 105

3.4.3.2 Data backup



The data backup can be done any time onto a USB stick or back to the USB stick. All data is saved (Day curves max. 60 days), i.e. the configuration and measurement data. When restoring the data, the measurement data or the configuration can be selected individually.

3.4.3.3 Firmware Update



Firmware updates can also be carried out via the USB stick. Just download the latest firmware from www.solare-datensysteme.de and save to the main directory on the USB stick.

The SolarLog has the possibility of taking care of firmware updates automatically. This function can be activated via the display dialogue "Config/Internal/Firmware", and is already setup with DSL connections.

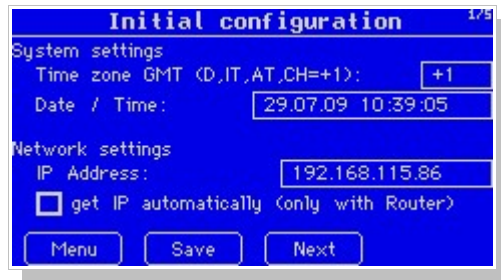
3.4.4 Configuration

The following describes the configuration dialogues presented in the order that they appear.

3.4.4.1 Initial configuration

The initial configuration contains the most important settings that need to be made, before the data logging and monitoring can begin.

After the very first start of the SolarLog1000, dialogue 1 is opened, later you have to navigate here manually via the main menu. The time zone GMT +1 is setup by default, which is suitable for all countries in Central Europe.



The time (clock) is important, which is already setup from the factory by default, but after prolonged storage can be lost. Then a random value is there, that has to be corrected.

The IP address is 192.168.178.49 by factory default and can be modified here to a network address, which suits a local network. Saving a change in the network address causes the SolarLog to restart. Generally the IP address only needs changing or controlled, if the SolarLog1000 is attached to a router or a PC.

Furthermore, it's possible to get a network address automatically. That is only possible if the SolarLog is attached to an internet router, which has this function ("DHCP"). After saving and the associated restart, the new IP address will be shown accordingly. The SolarLog can now be accessed via this address and has automatic access to the internet.



In dialogue 2, you can choose the inverter manufacturer, that is attached via the RS485-A interface. Note that the MT Sensor Box is also treated like an inverter and therefore runs as type "MT Sensor".



In dialogue 3, the RS485/422-B interface is defined, here you can also set the "Fronius" inverter.

Here is the possibility to activate the electricity meter attached to the SO input. This setting is important, as the electricity meter is treated/managed as a virtual "Inverter" on the SolarLog1000. An "electricity meter inverter" has subsequently always the number 1, all other "real" inverters follow thereafter.



Since the initial configuration is a quick guide into a functional and ready system, you can now go directly to the dialogue "Inverter detection". All previously entered data is automatically saved.

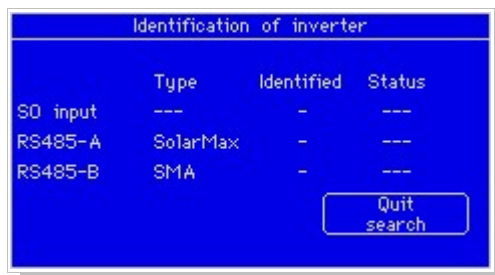
3.4.4.2 Inverter detection

The "Inverter detection" is used on SolarLog1000 to detect all attached inverters and to sort the assigned addresses. Via the dialogue "Start configuration" you have to define which interfaces are occupied by which inverters. Number and type of devices are now automatically recorded here. Based on the number and type of devices, the memory on the SolarLog is optimally divided in order to maximise long-term data storage. If the number of inverters is changed later on, the internal database has to be reformatted, and depending on the data already stored can be quite a complex and lengthy process.

The initial detection looks like the following dialogue:



Now press "Start" and it changes into the overview:



Every interface is shown with the predefined inverter-type, and everything is examined in turn. This process can be relatively long, such as when Sputnik/SolarMax searches through a 253 address range.

Important: For the inverter detection, all inverters need to be active. The detection cannot be carried out in darkness.

After detection, please check the number of found inverters. If one is missing, you should control the settings on the inverter and check cabling/wiring (see Installations Guide) and repeat the detection process again. Only when all inverters are successfully detected should you proceed.

If no inverters are detected, this also will be displayed and also in this case, the detection has to be repeated.



Once detection has been completed successfully, you'll be asked if you want to continue to the "Inverter configuration". You should confirm with "Yes".

3.4.4.3 Inverter Configuration

The inverter configuration consists of 5 sub-dialogues, but only the first 2 are important for the initial configuration. The other settings apply to the plant monitoring and the graphic scaling, which are all set to "good" values by default. Generally you don't have to make any changes.



All dialogues relate always to a single inverter. Which inverter is currently being configured is shown in dialogue 1 above at „**Number**“. This number can be changed by pressing on it. In this case a list of all inverters is displayed which you can select from.

The "number" is the internal position under which the inverter is managed. The number reflects again which address the inverter was assigned on the display. Inverters without an address assigned, e.g. SMS or Kyocera/PowerLynx are more or less randomly displayed or sorted according to serial number. This order can and should be changed with the help of the function "New number" to a real and desired address. This change should take place immediately after the

inverter detection has been done, as the associated data can't be applied to the new number. The field "New number" is only visible to inverter manufacturers, where the address number is not adjustable.

Device name and address/serial number are purely display fields and can't be changed.

The label should be changed or at least checked. There should be a clear, speakable text chosen for the inverter, as this text is used as a label in a lot of selection lists and graphics.

In dialogue 2, the connected inverters 'generator power' needs to be configured. This information is very important in terms of correct system monitoring. Please determine and enter their values meticulously and error-free.

Dialogue for multi-string inverters (e.g. SMA SB5000TL, Danfoss or Power-One, depending on the model):

String	Module-field	Connected-Module-perf.	Designation
1	1	1940	String 1
2	1	1940	String 2
3	1	1940	String 3

Buttons: Menu, Save, Next, Back

Dialogue for standard inverters (in which single strings are internally switched together):

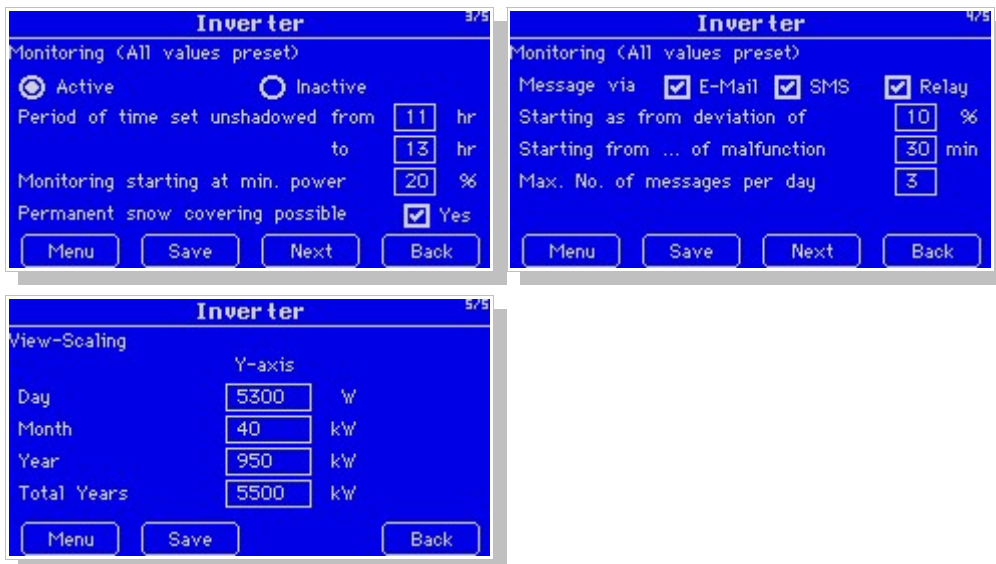
Connected module power: 3240 Wp

Module field (1-9): 1

Buttons: Menu, Save, Next, Back

- **Module field**
Via the "Module field", the same strings for system monitoring are merged together and monitored together. For a roof with the same modules, same orientation and identical roof slope, all strings are assigned the Module field "1". If even more inverters are connected, which have a **different orientated** roof, these strings receive the module field number "2" and so on.
- **Connected module power**
This value is needed to facilitate the comparison between the different inverter's performance and to offset their values against one another.

The other dialogues are already preconfigured and don't normally need to be changed. A description of the fields is available on page 83 in the configuration via web browser.

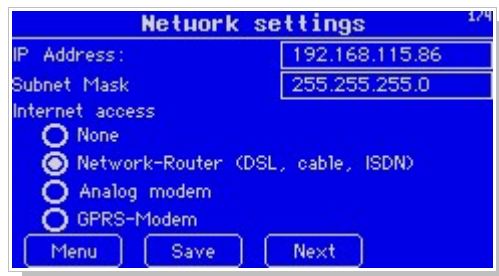


3.4.4.4 Network Settings

The network settings are always needed to be configured when

- you want to access the SolarLog1000 on a PC via a network.
- for those wanting to connect the SolarLog1000 through a router to the Internet.
- for those wanted to connect an analogue modem or GPRS modem for remote monitoring on the SolarLog.

3.4.4.4.1 Dialogue 1 - Basic settings



Here you can configure the IP address and subnet mask. The factory default address is 192.168.178.49 and needs to be adapted so that access via a PC is possible. An exact description on how to do this is on page.

Then you define the appropriate internet access for you.

„Network router“ means that a router needs to be attached to the network interface of the SolarLog1000. This router takes over the entire dial-up and data transfer into the internet. In general, DSL routers are used, but also increasingly routers attached to a TV cable modem. It's important that the dial-in is always possible for the SolarLog. The router should not be turned off, otherwise proper notifications won't get through in the case of faults/breakdowns or the homepage won't have the correct data.

„Analogue modem is valid for a telephone connection.

„GPRS modem means a connection to the internet via a mobile phone network.

3.4.4.4.2 Dialogue 2 - Network Router

The attached internet router has its own IP address, which must be entered under "Gateway". How to find the IP address of the router is found and described on page . In some networks, especially at companies, the DNS server has a separate address and not identical to the Internet router (Gateway). In this case, a separate DNS can be configured.

3.4.4.4.3 Dialogue 3 - Analogue Modem

If a telephone line is available, the SolarLog1000 can with the help of the SolarLog1000 Modem Package gain access to the Internet. This is always necessary when you want to receive information remotely per email, SMS or on the homepage.

The internet-by-call provider Arcor has already been setup by default, complete with dial-in number, Username and password. The cost is 1 cent/minute, but are also time-dependent. Of course, any Internet-by-call provider can be used here.

Note: Solare Datensysteme Ltd. is not liable for costs resulting from data connections.

On some telephone systems, it's necessary that before the actual telephone number a "0" must be pre-dialled. This setting can also be made here. By default, you can hear the dialling process of the modem, which gives you a good test function until the connection has been established. Later, the dial tone will be turned off.

Problems with the internet connection are best tested with a conventional telephone, whether the telephone line works and is active. If "0" as prefix is to be used, this then can be tested easily and fast.

When using an analogue modem, the SolarLog1000 is generally capable of a dial-in connection. That means that the SolarLog can be dialled into from "outside" using a PC and modem. The SolarLog1000 recognizes this and establishes a data connection. This process is described on page 113.

The standard password is "solarlog" which can and should be changed here.

3.4.4.4 Dialogue 4 - GPRS Modem

In many cases in which no DSL or telephone line is available, the connection to the Internet via a mobile phone network is the only option available. From a cost perspective, there are many very cheap data connection possibilities with providers like the mobile phone provider "Simyo" in Germany. Monthly costs of under 5 Euros are possible, but of course depend on the plant size and the number of transfers per day.

The configuration is very easy, it needs only a "APN" (Access Point Name), a Username and password. The factory default has "Simyo" already preconfigured. If the GPRS modem with a SIM card is used, no settings have to be changed.

Note: Many SIM cards need to have the data option activated via a telephone call first.

The following APN/User settings are set for known German mobile phone providers:

	Simyo / Eplus	O2	Vodafone	T-Mobile
Used Network	EPlus	Eplus + D1	D2	D1
APN	internet.eplus.de	surfo2	web.vodafone.de	internet.t-mobile
User	eplus	[leave empty]	[leave empty]	t-mobile
Password	eplus	[leave empty]	[leave empty]	tm

(All infos are for Germany and without any guarantee for its correctness)

Please also enter a valid PIN code.

Then save the settings and go to the "Test" button to check the signal strength of the GPRS connection. The connection should at least be "Good", otherwise no secure and permanent connection can be guaranteed.

Note to "User" and "Password".

If GPRS provider recommends that the 'Username' and 'password' be left 'empty', sometimes something needs to be entered for a successful data connection to be established.

3.4.5 Internet

Via the settings "Internet", all information regarding the internet-server being used and the homepage should be made.

3.4.5.1 Basic settings



Here the access data for the internet connection is to be entered.

Warning! There are two different types of Internet connections:

1. Solar Engineer Portal/SolarLog Portal

This portal costs money to use and offers in addition to the visualization of the plant, a host of other evaluation tools and monitoring functions for the Solar Engineer.

2. SolarLog homepage

The homepage is free and is meant as an entry to Internet monitoring. Registration must be done via „www.solarlog-home.de“, in order to receive the necessary access data/information.

3.4.5.2 email/SMS

Here you can activate the email and SMS function, up to 2 email addresses for notifications can be entered and one SMS mobile phone number as well.

Note: The SMS function costs to use. For test purposes, 3 free SMS's are available after registration, then afterwards an SMS quota can be purchased via „www.solarlog-home.de / SMS“.

Through the last sub-dialogue, you can send a test message, which needs to be successfully sent at least once.

3.4.5.3 Homepage

Here you can set the interval for updating the Data export to the Internet. "Daily" is set by default, but depending on the type and costs to make the internet connection, you can reduce this time down to a minimum of 10 minutes.

In the other sub-dialogues, you define a plant description for the homepage, as well as triggering a connection test.

3.4.6 Advanced

The advanced functions are generally rarely used and therefore found in this separate menu point. The following items are available:

- Plant monitoring
- Large display
- Alarm contact (Anti-theft security)
- RS485/EIA485 wireless package

3.4.6.1 Plant monitoring



These helpful settings manage centrally which disturbances/faults trigger which alarms. It's recommended as a final configuration step to set this parameter.

LED „E“: In the case of an fault/disturbance, the LED "E" begins to blink. This feature is useful, when the SolarLog is to be used without an Internet connection, but the plant owners still want to have a simple way of monitoring the plant.

„Relay“: In the case of a fault/disturbance, the potential-free contact (relay) closes. This feature for example can activate an alarm light/beacon, to give a quick visual control - even without Internet connectivity.

3.4.6.2 Large display

There are currently 3 "classic" large displays supported:

- Schneider Display Technology
- RiCo Electronic
- HvG Hard & Software Engineering

These displays can be attached via the RS485 bus or even on the S0 pulse input. If the RS485 bus is already occupied by an inverter, a display can still be looped parallel into the data bus. Observe strictly the instructions from the display manufacturer regarding the wiring and possible pre-configuration.

3.4.6.3 RS485/EIA485 wireless package

The RS485 wireless/radio package is an optional accessory to connect remote inverters, which were difficult to attach per cable to the SolarLog. Since wireless connections never work 100% predictably, there is a test function to examine the connection. It's important that the RS485 interface to be tested is configured to the corresponding inverter via the dialogue "Config/Start/Start Config" and that the radio modules are set to the corresponding transmission speed of the inverter. For the test, there's an appropriate test adapter available for the wireless package. Please refer to the manual regarding the wireless package settings.

3.4.7 Internal

The dialogues in the "internal" area are rarely needed, usually only for the initial installation. The following items are available:

- Data correction
- System settings
- Firmware
- Language settings

3.4.7.1 System

The system functions control the backlight on the display, i.e. the On and Off time, plus a dimmer function for the display when it's not being used over a longer period.

The "Slide show" function switches, similar to a screen-saver, after a period of time between the individual graphic functions.

Furthermore, the display can be protected against illegal access via a PIN code protection.

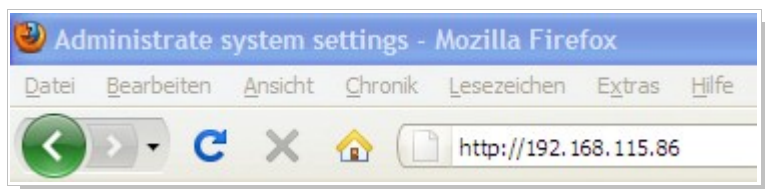
In the last sub-dialogue, the SolarLog can be returned to factory settings.

3.5 Configuration via PC

The configuration can alternatively be carried out on a PC via a web browser (e.g. Internet Explorer).

Note: Not all functions, that are configurable on the display are available on the web interface. Generally, all functions required for a unit installation, e.g. inverter detection can only be carried out on the display.

To access the configurations dialogue, please give in the network address of the SolarLog.



Note: The address above only serves as an example. Please use instead the network address that you entered manually on the display or the address that was displayed during an "Automatic detection".

The main menu of the SolarLog1000 now appears:



Please choose at the top right "Configuration".

3.5.1 Basic Configuration

The basic configuration includes the most important settings. If used without an internet connection, these settings are usually sufficient.

3.5.1.1 LAN - Network Settings

The network settings are usually set on the display and don't normally need to be changed anymore.

The screenshot displays the 'Configuration // Basic // Lan' web interface for a SolarLog1000 device. The top navigation bar includes 'Yield data', 'Diagnosis', and 'Configuration'. The left sidebar lists navigation options: 'Basic' (selected), 'Lan', 'Groups', 'Inverter order', 'Inverter', 'Forecast', 'Graphics', 'Extended', and 'Internal'. The main content area is titled 'Configuration // Basic // Lan' and contains the following sections:

- Network settings:** IP address (192.168.115.86) and Subnet mask (255.255.255.0).
- Internet access:** Radio buttons for 'No internet', 'Network router (DSL, cable, ISDN)' (selected), 'Analog modem', and 'GPRS modem'.
- Network router (DSL, cable, ISDN):**
 - IP address: ☐ Get automatically (DHCP)
 - Gateway: 0.0.0.0
 - Extra DNS server: ☐ Active

At the bottom, there are 'Save' and 'Cancel' buttons.

3.5.1.1.1 Internet access

Please check here which way SolarLog1000 is connected to the internet. Depending on the settings, various options appear at the bottom area of the screen.

If the network router is selected, the SolarLog directs all internet-related data via the network interface to the Gateway address. The router there is responsible for the correct delivery of data.

Note: The configuration of the network settings through your web browser is identical to the operation directly on the display.

Saving the settings restarts the SolarLog1000, so that the changes to the network configuration takes immediate effect.

3.5.1.2 Plant groups

Since the SolarLog can manage many inverters at once, it's necessary to group the individual inverters into inverter groups. These plant groups are found then in all inverter dialogue selections, which strengthens the overview immensely. Of course it's still possible to select a sub-selection and then the individual inverters, e.g. for a detailed view of the data.

For each plant group, an individual feed-in tariff can be set, as well as the year's target value. That makes also plant groups ideal for covering plant expansions, etc. A plant with originally 5 inverters and 30 kWp from 2004, can be expanded in 2007 with a further 3 inverters and 20 kWp, can also be comfortably managed on SolarLog1000 as separate groups. Feed-in tariffs and the year's targets can be configured in the dialogue "Forecast", currently possible only via the display directly.

Each plant group can be displayed onto its own large display.

Configuration // Basic // Groups

Groups

All inverters belong to one system ☐

The inverters are divided into groups ☒

Group definition

Nr.	Description	Inverters (max.15)	Add	Delete
1	Haus	2,3	Add	Delete
2	Scheune	4,5	Add	Delete
3			Add	Delete
4			Add	Delete
5			Add	Delete
6			Add	Delete
7			Add	Delete
8			Add	Delete
9			Add	Delete
10			Add	Delete

Save Cancel

Up to 10 plant groups can be set, with up to 15 inverters per group. Via the Add and Remove buttons, you can easily assign individual inverters or remove them from a group.

After saving the changes, the settings are immediately active.

3.5.1.3 Inverters order

The order of the inverters is established during the detection phase and is normally sorted by serial number and communication address. Should the order be changed in the SolarLog, this can happen easily in this dialogue.

Configuration // Basic // Inverter order

The inverters can be reordered within the interface area(same colour).

Currently		New	
Pos.	Description		Description
1	WR 1 (1554)		Add Delete
2	WR 2 (1100024461)		Add Delete
3	WR 3 (2000045565)		Add Delete
4	WR 4 (2000051199)		Add Delete
5	WR 5 (2000054353)		Add Delete

☒ Leave data unchanged (eg inverter exchange)
☐ Reorganize data to new positions (eg extensions). Can take some time depending on data volume.
☐ Erase all data (recommended at initial setup)

On the left side the inverters are listed in the old order, with the current position, the inverter name and serial number/address number. On the right side, the order can be changed by clicking on "Add".

The inverter order can only be reordered within a data interface. An inverter, which is connected via the S0 input or Bluetooth, can't be swapped therefore with an RS485-B inverter interface.

The change of order applies also to the data within the SolarLog. Therefore there are 3 ways to reorganize your data accordingly:

1. Leave data unchanged

Was there inverters exchanged due to faults and then via inverter detection newly detected, the new order may differ to the previous one. Therefore, it is absolutely necessary to configure the new order in this dialogue. However, the data doesn't have to be reordered – nothing has changed from the perspective of the Data-logger.

2. Reorganize data to a new position

Was the plant expanded, or should the data on the existing plant be resorted, it is important that the data to the inverters also be reordered. If that's not done, there's going to be a real "data salad" after saving the new order.

The reorganization of the data can take some time depending on the amount of data already recorded. This process should not be cancelled under any circumstances!

3. Erase all data

If the plant is being setup afresh, this point should definitely be chosen. This deletes the existing (few) data and SolarLog can begin recording to a clean database.

3.5.1.4 Inverter

In this dialogue, all the relevant data from the inverters is stored.

The device name and serial number is read from SMA devices and various other manufacturers automatically. On other inverters, the communication address will be displayed.

Please check if all inverters have been correctly recognized. Each inverter is uniquely identified by its serial number.

Module Field	Connected generator power	Description
INV	1	
String 1		
String 2		
String 3		

The inverters are always sorted by the serial number or communication address. If the order is to be changed, this can be changed through the dialogue "Inverter order". Please note that the ordering should be carried out immediately after inverter detection.

3.5.1.4.1 Connected generator power

The connected module power on the inverter in Wp. The total power can be calculated from the 'module power' x 'number of modules' (together at each inverter, not the entire plant)

3.5.1.4.2 Pac correction factor

When the electricity yields displayed on the inverter display is compared with the calibrated electricity meter, you'll notice a discrepancy. Either the inverter shows too much or too little. In order to balance out this difference, you can define a correction factor here.

All yield data is saved internally without the correction factor, it's only at data output that the factor is offset. This gives the freedom for the factor to be applied at any time later on.

The formula for calculating the correction factor is:

$$\text{Yield electricity meter} / \text{Yield inverter} \times 1000$$

If the inverter has no display, you have to leave the correction factor at 1000, so that after about 1 week a factor can be determined.

3.5.1.4.3 Product label

Short description of the inverter, in cases of non-multi-string inverters possibly the location of the connected modules.

Monitoring (Detects inverter breakdown and performance deviation of the generator)

☒ Activated
 ☐ Deactivated

Unshadowed from Until o'clock

Min.power feed-in % of generator performance

Message as e-mail ☒ SMS ☒

From % deviation

and period of malfunction Min.

Maximum Send max. messages per day

Permanent snow covering expected?

☒ Yes
 ☐ No

Graphic - Scale

Definition

Y-Scale

View:

Day

Month

Year

Total years

W

kW

kW

kW

Max.Y-axis

Save

Cancel

3.5.1.4.4 Monitoring

The monitoring of individual inverters, with its strings and modules attached are an important function of the SolarLog1000. Malfunctions can be reported by email or SMS.

Monitoring and recognition:

- 1.Breakdown of inverter
- 2.Performance drop of a module field

The monitoring is based on the constant performance comparison of all inverters including the single strings on multi-string inverters. If the actual performance goes below a certain tolerance from the desired performance, after a selectable delay a notification will be triggered.

Each string attached is assigned to a module field. Module fields are divided according to the same type of solar module, module slope and module orientation. If a plant has all the same

modules from the same type and same orientation, then only a single module, e.g. "1" is defined. Unused strings needs to be turned off using "0".

More module fields need to be defined if inverters have differing orientations.

Ideally, each field consists of at least two individual strings, which are capable of mutually monitoring each other.

Example:

A plant with 23.6 kWp is divided into 3x SMA SB5000TL, 2x SMA SB2500.

Which are located on a barn roof 18 kWp with 30° slope, 20° South-East deviation, and on an adjacent garage 5 kWp, elevated, 32° inclination, 0° South deviation

Location	Inverter	String performance	Module field
Barn	1.SB5000TL	2000	1
Barn	1.SB5000TL	2000	1
Barn	1.SB5000TL	2200	1
Barn	2.SB5000TL	2000	1
Barn	2.SB5000TL	2000	1
Barn	2.SB5000TL	2200	1
Barn	3.SB5000TL	2000	1
Barn	3.SB5000TL	2000	1
Barn	3.SB5000TL	2200	1
Garage	1.SB2500	2500	2
Garage	2.SB2500	2500	2

All connected strings can mutually monitor each other, the strings from module field-1 several times, both strings from module field-2 mutually monitor each other.

If a single module dips in performance, the string performance will fall in spite of the same sun radiation conditions and be recognized and reported.

The performance comparison is always reliable even in cloudy weather. The only important thing is that all modules are not over shadowed. Therefore, a monitoring period can be set in the configuration to guarantee that no shading occurs.

Since the performance measurement in inverters is very inaccurate below a certain threshold, a minimum percentage can be set under which the monitoring is suspended.

If snow covers the units, it can also lead to errors in the reporting. These are messages from the performance comparison, when part-coverage happens, or breakdown messages when the inverter no longer turns on due to snow coverage.

There are two approaches to minimize this problem:

1. The minimum percent value from which performance monitoring begins should be chosen as high as possible, e.g. 30%.. With a generator power of 4500 Wp, the performance monitoring first begins at 1350 Watts. Partly shaded modules pull down the unshaded module's performance so much that you seldom or never reach the required 1350 Watt. Thereby this solves the problem for partial coverage.

2. Failure messages always occur when the inverters are not working or offline during the pre-configured unshaded times. It is assumed that a defect has occurred. That means that even complete snow cover would be reported as a breakdown. To solve this problem, there is an indicator for snow cover. If this is set, no failure messages are given if all inverters are offline. The fact that all the installed inverters are broken is possible (e.g. after lightning), but rather unlikely. So if the indicator is set, it is assumed that the inverters do not work merely because the modules are completely covered by snow. The indication is also dependent on the current date. Only between early November and late April will it be considered. Outside this period, so in Spring, Summer and Autumn, it is automatically disabled. Then, the monitoring works as usual, and reports also a complete failure of all inverters.

The "Fault duration" indicates how long a fault is continuously sent before it is recognized as a "breakdown". The minimum fault duration is 5 minutes, but should actually be even longer.

To prevent too many disruptions being reported too often, a maximum number of messages per day can be defined.

3.5.1.4.5 Graphic Scaling

Normally nothing needs to be changed here, as the SolarLog calculates the generator power values input automatically. But, of course, these values can be changed to suit your needs.

For each period (daily value, monthly value, annual value, total) the maximum value in kW can be entered. (except for day).

3.5.1.5 Forecast

The forecast is used in the current year to provide insight as to whether the plant will reach the desired annual yield or not.

In addition, a percentage value is allocated each month from the "German Yield Statistics" of recent years.

Of course you can never know how the summer will be and if one has a full month "of hail", but in general, the annual forecast in September is already amazingly accurate.

The SolarLog1000 always calculates the target value that accumulates daily. That means at the beginning of the month not the entire months target is demanded, but only the days already passed and current days. The SolarLog forecast takes into account the income of all previous years and can account for local weather events (e.g., mostly snow in December, etc.).

Basic

» Lan
» Groups
» Inverter order
» Inverter
» **Forecast**
» Graphics

Extended

Internal

Configuration // Basic // Forecast

System data

System size

16260

WP

Feed-in tariff

49.21

Cent

Target / actual - calculation

Yearly target

890

kWh/kWp

Monthly portions % (Total = 100%)

Jan	Feb	Mar	Apr	May	Jun
2	6	9	11	11	13
Jul	Aug	Sep	Oct	Nov	Dec
13	12	10	6	4	3

Save

Cancel

3.5.1.5.1 Plant size

Please enter your size in plant **Watt peak** here.

3.5.1.5.2 Feed-in tariff

Please enter here the feed-in tariff value here. This factor calculates the yield in euro in the visualization.

3.5.1.5.3 Annual target

Here the desired year's target is entered in kWh/kWp.

3.5.1.5.4 Monthly share

Your monthly shares must in total be 100%. You can also adjust the values to suit your local conditions accordingly.

As a rule though, you shouldn't have to change anything.

3.5.1.6 Graphic

The graphical view is determined by a division of the X-and Y-axis.

On the X-axis is the time lapse as opposed to measurement value on the Y-axis.

For the day view, it's necessary to define for every month the day's beginning and end, so as to prevent the 'data begin' or 'data end' being "swallowed" in the display.

Note: The SolarLog1000 works regardless of this setting and collects data as soon as the inverter starts delivering data and stops when the inverter is shut down at night.

Thus, the two upper input lines are assigned to the start of the day, and the bottom two rows of data to the end of the day.

Changes don't normally need to be made.

Configuration // Basic // Graphics

Visualisation

X-scale Start of day (Time in hours)

Jan	Feb	Mar	Apr	May	Jun
8	6	6	6	6	6

Jul	Aug	Sep	Oct	Nov	Dec
6	7	7	7	7	8

X-scale End of day (Time in hours)

Jan	Feb	Mar	Apr	May	Jun
17	19	20	21	21	22

Jul	Aug	Sep	Oct	Nov	Dec
22	21	20	19	17	17

Save **Cancel**

3.5.2 Advanced

Under "Advanced Configuration", the Internet-related functionality in particular is found. If the SolarLog1000 doesn't have an Internet router connected, this configuration point can be skipped. It is in any case recommended that the SolarLog be connected to the Internet, at least to ensure the automatic notifications via email/SMS.

3.5.2.1 Internet

Through this dialogue, the homepage views data can be configured.

Similarly, the Online Banner may be defined according to one's own wishes and text .

Basic

Extended

» Internet

» E-mail

» SMS

» Export

» Malfunction

Internal

Configuration // Extended // Internet

Homepage

Title	[Anlagenbezeichnung]
Operator	[Betreibername]
E-mail	[Kontakt-Emailadresse]
Location	[Standort der Anlage]
Module	[Beschreibung der Module und Hersteller]
Inverter	[Wechselrichterbezeichnung und Hersteller]
Output	[Größe der Anlage] kWp
Start of operation	[Installationsdatum]
Orientation	[Modulneigung und Ausrichtung]

Event records

Visible on Homepage	☒
---------------------	-------------------------------------

Banner

Line 1	[Kurzbez. Anlage]
Line 2	4,5 kWp in 99999 Musterort
Line 3	im Netz seit Januar 2008
Link to homepage	www.solarlog-home.de/benutzername0

More on this in the chapter "Homepage"

3.5.2.2 email

The SolarLog1000 includes an email program which can send messages in certain situations. These are:

- Overview day's yield
- Inverter faults
- Inverter failure
- Deviation of target performance

Basic

Extended

» Internet

» E-mail

» SMS

» Export

» Malfunction

Internal

Configuration // Extended // E-mail

E-mail basic settings

SMTP server	solarlog-home.de
User name	benutzername0
Password	
E-mail address from	benutzername0@solarlog-home.de
E-mail address to	eigene_email_adresse

E-mail notification

☒ Activated
 ☐ Deactivated

Sending time

23:23

☒ Mo
 ☒ Tu
 ☒ We
 ☒ Th
 ☒ Fr
 ☒ Sa
 ☒ Su

Last transmission

29.07.09 14:35:35

Status

Err 1

Save

Cancel

Start test transmission

The settings in this dialogue are used both as a basic configuration for sending emails in general, as well as a configuration if and when the daily earnings information should be sent.

Even when no daily yields should be sent, it is necessary to give in the email server data here for example to get 'faults' emailed.

„SMTP server“, „Username“ and „Password“ taken from the documentation of your internet/email provider.

Note: at www.solarlog-home.de you can request a free homepage and email address. On activation you will receive instructions for the configuration of the access data.

If you use your own email server, then "email from" and "email to" are identical and is one's own email address.

"Last Transmission" and "Status" indicate when the SolarLog1000 last tried to send an email.

Possible status codes:

1 – Can't resolve the IP address or SMTP server –

=Still unable to connect to the Internet

Cause:

-No Gateway configured

-DNS server not available/reachable (firewall?)

2 – Username oder Passwort false, or not accepted

3 – SMTP server doesn't respond

99 – Unknown error

Email functionality can be tested directly during configuration by using the button "Start test transmission". Save the changed settings.

Basic

Extended

- » Internet
- » E-mail
- » SMS
- » Export
- » Malfunction

Internal

Configuration // Extended // SMS

SMS basic settings

SMTP server	solarlog-home.de
User name	benutzername0
Password	
E-mail address from	benutzername0@solarlog-home.de
E-mail address to	benutzername0@solarlog-home.de
Keyword Subject	SMS0173...

SMS notification

☐ Activated ☒ Deactivated

Sending time

☒ Mo
☒ Tu
☒ We
☒ Th
☒ Fr
☒ Sa
☒ Su

Yield in subject ☐

Last transmission

Status

The sending of SMS happens in two steps. First an email is sent to the email provider that offers the SMS service. They recognize a keyword in the subject line of the email, that this email should be sent as an SMS to a certain number.

Email providers that offer this service in Germany include "T-Online, Arcor or GMX".

"Yield in the subject line" means that the SMS-text will also be written into the subject line. Some email providers send an SMS free of charge for incoming emails with the subject line as information. This suffices to give yourself an "cheap" overview of your plant.

Apart from that, the configuration is as described in "email".

Particularly simple is the configuration if you use the SMS service available at www.solarlog-home.de. There is a charge for this service.

The SMS dispatch can be tested during the configuration with the button "Start test transmission". Save the changed settings.

3.5.2.4 Export

Basic

Extended

- » Internet
- » E-mail
- » SMS
- » **Export**
- » Malfunction

Internal

Configuration // Extended // Export

Cyclic data export

☐ Activated ☒ Deactivated

FTP server: solarlog-home.de

User name: benutzername0

Password:

Directory:

Update interval:

- ☐ 10m
- ☒ 15m
- ☐ 30m
- ☐ 1h
- ☐ 2h
- ☐ 4h
- ☐ 8h
- ☐ daily

Data format:

- ☒ SolarLog
- ☒ CSV

Last transmission: 03.06.08 08:53:06

Status: OK

Save **Cancel**

Start test transmission

The Export function is used to transfer the yield data regularly to a website to present the plant including online data on the internet. To set it up and run a website, see the section "Homepage" below.

Change the examples according to your own data.

Under „FTP server“ the name of the homepage is normally entered.

„Username“ and „Password“ are the access data to the homepage.

A "directory" should only be entered if the SolarLog website is not directly in the main directory where your website should be. Otherwise, leave the field completely blank.

The updating interval determines how often the SolarLog1000 updates the data. Data is always copied every 5-minutes even without being sent, even though the interval could be much larger,

i.e. 1 hour. Depending on your internet tariffs/rates, you can select indirectly here the desired transfer volume. As an indication, each transfer has a maximum of about 10 Kbytes transferred, not very much.

Should the SolarLog homepage be fed via the Export function, please choose the "SolarLog" data format. Alternatively or additionally, a data export in CSV format can be selected. These files are then transferred to the homepage in a readable format for Excel. This can be used if needed for further evaluations. Exports are carried out mornings and evenings (Online/Offline switch) of all stored data. In addition, the 5-minute data is always stored with a date, so that an archive with even very old data is formed.

Note: The data transfer doesn't happen necessarily immediately after the configuration, it may take up to 12 hours, until all data is transferred. That's because of the fact that older data which has usually more volume can only be transferred when the inverter switches On and Off (Online/Offline switch). To speed up this process the SolarLog can also be briefly switched Off and On. The data transfer takes place after 10 minutes.

If there are problems with the data transfer, this can be checked in the field "Last transmission" and "Status", to see when the SolarLog1000 last tried to copy data.

Possible status codes:

- 1 – Can't resolve the IP address
 - =Still unable to connect to the Internet
 - Cause:
 - No Gateway configured
 - DNS server not available/reachable (firewall?)
- 2 – FTP server not found. Please check for correct spelling.
- 3 – Username or password wrong, or not accepted
- 4 – Can not change to desired directory
- 5 – File could not be sent

Note: The status codes of the SolarLog1000 are different to those of the SolarLog100e/400e.

The data transfer can be tested directly at the configuration button "Start test transmission". Save the changed settings.

For those who don't have internet access via a router, i.e. the SolarLog1000 has no internet access, you can export the data manually (CSV format) onto a disk.

The configuration is particularly easy and straightforward if you choose the free service under www.solarlog-home.de.

3.5.2.5 Fault

Basic

Extended

Internal

» Internet

» E-mail

» SMS

» Export

» Malfunction

Configuration // Extended // Malfunction

Inverter

1 S/N: 1554

List of all status codes:

0:Data

List of all error codes:

Number	Active	Status	Error	From Code	Until Code	E-mail	SMS	After x Activate measurements	Max. number per day
1	☒	☐	☒	1	99	☒	☒	40	10
2	☒	☒	☐	1	99	☒	☒	20	10
3	☐	☐	☒	0	0	☐	☐	0	0
4	☐	☐	☒	0	0	☐	☐	0	0

Save Cancel

The SolarLog1000 may due to a certain status or error code trigger a message via email or SMS. Through this dialogue you can configure any status/error codes, and at which error duration a message gets sent at. Also, the maximum number of messages to be sent can be entered. This prevents constant "smaller" plant problems being constantly sent via SMS.

The available status/error codes depends on the inverter type. Please refer to the inverter manual, which status/error codes for an automatic notification are relevant. By default, all error codes are reported (suitable for SMA).

3.5.2.6 Status and error codes of SolarMax inverters

The area from 1-31 affects error messages.

The area from 32 to 49 affects status messages.

3.5.3 Internal

The "Internal configuration" includes data backup, data import from initial start data and updating the SolarLog1000 software.

3.5.3.1 Backup

Basic

Extended

Internal

» Backup

» System

» Update

Configuration // Internal // Backup

Backup (Automatically)

☐ Activated
☒ Deactivated

FTP server

solarlog-home.de

User name

benutzername

Password

.....

Directory

Backup interval

☐ Daily
☒ Weekly

☐ Mo
☐ Tu
☐ We
☐ Th
☐ Fr
☐ Sa
☐ Su

Save

Cancel

Backup (Manually)

Save data on hard drive

Process data

Load data from hard drive

Durchsuchen...

Load

3.5.3.1.1 Backup - automatically

Here, a regular backup to an arbitrary site via FTP protocol can be configured. The backup includes all the statistical data. Since each transfer contains larger amounts of data (> 1 Mbyte), automatic data backups via analogue and wireless shouldn't be activated.

3.5.3.1.2 Backup - manually

If there's no connection to the internet, the data backup can also be done manually. In this case, a file gets saved to a chosen directory on the PC.

Similarly, an old backup can also be used to restore data. This for example could be necessary after a software update. To load the data backup, the SolarLog1000 asks for Username and password. Enter here

Username: solarlog

Password: solarlog

3.5.3.1.3 Data correction

The screenshot shows a web interface with two main sections: "Data correction" and "Data import".

Data correction: This section contains two input fields. The first is labeled "Date" and has a text box with a placeholder "(for example 01.09.06)". The second is labeled "Daily value" and has a text box with a placeholder "(for example 48.1)" followed by "kWh". Below these fields is a blue button labeled "Adjust".

Data import: This section contains a text area with the instruction "Initial inventory of day yields in CSV-Format (DD.MM.YYYY; Day yield in Wh)". To the right of the text area is a text box and a yellow button labeled "Durchsuchen...". Below the text area is a blue button labeled "Load".

There's also the possibility to make a correction or give in afresh the daily sum at any time.

The Date needs to be always in 8 digits, 2 for the day, 2 for the month and 2 digits for the year separated by a decimal point.

The daily value is entered as Wh and must correspond to the electricity meter value, meaning the real day's value.

3.5.3.1.4 Data import of existing day's data

Similarly, existing data (daily values) taken down manually can be fed into the SolarLog1000. This is useful if a lot of data needs to be entered retrospectively, which would take too long using the function "Data correction".

The file must consist of individual lines of text, which have the date and daily income in "Wh" (not kWh!) separated by a semicolon.

Example:

01.04.06;136435

02.04.06;128219

and so on.

Note: The year may also be 4-digits in length.

The data import deletes the existing data memory completely before daily values are restored. That's why the Data import should always take place after the initial startup of the SolarLog takes place.

The daily total value is split proportionately into the configured inverters power. Note that the sum of the configured inverters power has to be the same as the total value of the entire plant in the dialogue "Configuration/Basic/dialogue". If this is not the case, the SolarLog will show differing daily values.

Enter the electricity meter stand. The daily value is corrected via the correction value. If the initial correction factor is not yet known, the value 1000 should be set.

The data import can only be implemented if all inverters are properly detected and configured.

To activate the data import, the SolarLog1000 asks for a Username and password. Enter here

Username: solarlog

Password: solarlog

.

Note: Please check whether the format of the data also meets the requirements mentioned above. Open the program "WordPad", which is available under any Windows installation. Then open the old data file and check the data format. No apostrophes at the beginning or end of a line are allowed. You can correct the data file directly with WordPad and then save it.

3.5.3.2 System

The "System data" are all the data entered by you during configuration. Recommendable is a backup of the system data when the configuration has changed.

After a firmware update it could be that all data was reinitialized meaning deleted. If so, then you need to load a system backup directly after a firmware update.

During the loading of the system backup, SolarLog1000 asks for a Username and password. Enter here

Username: solarlog

Password: solarlog

.

Basic

Extended

Internal

» Backup

» System

» Update

Configuration // Internal // System

System backup

Save system settings on hard drive

Process data

Load system settings from hard drive

Durchsuchen...

Load

Set to factory defaults

Reset

System settings

Choose language

English

Current serial number

14522170

Licence key

Storage interval

☒ 5min
 ☐ 10min
 ☐ 15min

Time zone GMT

+1

(Central Europe=+1)

Date / Time

30.07.09 07:54:25

New

Configuration

Additional login?

☐

Old password

New password

3.5.3.2.1 Date/Time

The SolarLog1000 has an integrated real-time clock, which works even after a power failure or a network drop for a very long time (50 days). If a connection to the Internet exists, the clock adjusts itself daily so that manually setting the clock should never be necessary. If, however, a wrong date or time is set, you can easily correct it here or reset it. Simply re-enter the desired date and time. Example: The entry for 28.2.2009 17:31 time would read: 28.02.09 17:31:00

The switch to daylight saving is done automatically and doesn't normally need setting manually.

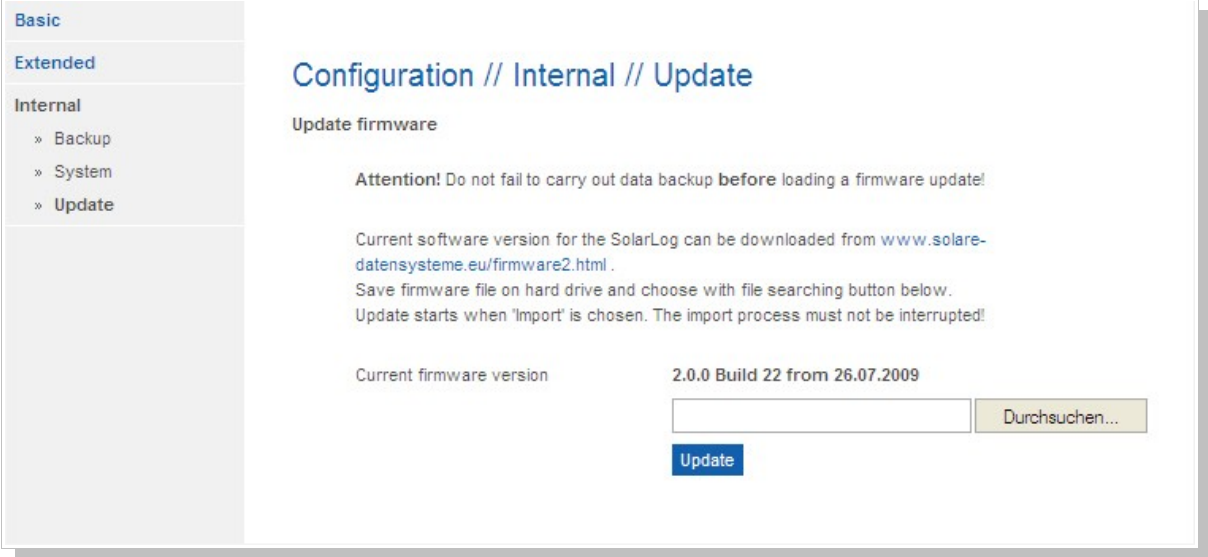
3.5.3.2.2 Additional Password Question

In order to protect the configuration area, a password protection can be setup. This password will be needed when accessing the configuration for the first time. The SolarLog now allows access

and changes to the configuration. 5 minutes after the last login to the configuration, the login closes, and you have to sign in again.

To change the password, the old password must be entered again for security reasons. When delivered and after resetting to factory default, the password is not stored, so you don't have to enter anything at the "old password" dialogue.

3.5.3.3 Update



The screenshot shows the 'Configuration // Internal // Update' page. On the left is a sidebar menu with 'Basic', 'Extended', and 'Internal' sections. Under 'Internal', there are links for '» Backup', '» System', and '» Update'. The main content area is titled 'Update firmware' and contains an 'Attention!' warning to backup data before updating. It provides a link to the firmware download page (www.solare-datensysteme.eu/firmware2.html) and instructions to save the file and use the 'Durchsuchen...' (Search) button. Below this, it shows the 'Current firmware version' as '2.0.0 Build 22 from 26.07.2009' and includes an 'Update' button.

Using this feature, you can update the software on the SolarLog1000.

This allows new features at any time to be integrated into the system, or bug fixes can be implemented.

To load the firmware, the SolarLog1000 asks for a Username and password. Enter here

Username: solarlog

Password: solarlog

It is absolutely necessary before an update to create a current backup of the systems data and other data.

Latest updates are always available to download at the website
www.solare-datensysteme.eu/firmware2.html

As a general rule, a manual update is not necessary, since the SolarLog automatically receives and installs new released updates retrieved via the Internet connection and installed overnight. No data is lost during a firmware update.

3.6 Homepage

An interesting feature on the SolarLog1000 is the possibility to transfer data to the internet. Thus, any number of remote internet queries are possible and also the presentation of the facility for friends and people interested in solar technology is possible in this way.

The homepage visualization works completely independently of your SolarLog1000. You need no dedicated line or the like.

Only prerequisite is that you have a "homepage". In general, the Internet provider offers a homepage for free. There are also free providers, that offer free homepages via their website (e.g. www.arcor.de)

A further condition is that the data from the homepage can be sent via the FTP protocol.

The actual content of the homepage, i.e. the individual pages and graphics, are available at <http://www.solare-datensysteme.eu/fhome0.html>. The files must be copied without changes to the homepage.

Then you must configure SolarLog1000, so that the device "knows" where to send the data regularly.

In summary therefore, you need the following things to setup a SolarLog homepage:

- A Homepage
- The website has to be writeable via the FTP protocol
- The actual files for the homepage
- Configuration on SolarLog1000 (Export)

You can also use a picture of your plant as well. This requires only that the file "solaranlage.jpg" be replaced with your own image.

Once a homepage works successfully, the "Online Banners" are automatically available. This is a small graphic with short and concise information about the plant and also displays the day's earnings. The daily yield is updated automatically depending on the configured transmission interval in the dialogue "Export"



The Banner can be integrated into other homepages as information and as a link. The html code found on the homepage is the file "iframe.html" and looks as follows:

```
<iframe src="http://www.solarlog100.de/visu/karwath/banner.html" width="200"
height="120" name="SolarLogBanner" scrolling="no" frameborder="0">
```

<p>Your browser does not support frames::

You can use the embedded page via the following link info:

```
<a href="http://www.solarlog100.de/visu/karwath/banner.html">Banner</a></p>
</iframe>
```

Of course you need to modify the address after the "http://" to suit your own homepage.

3.6.1 Free Homepage

If you do not have your own web space, Solare Datensysteme Ltd. offers via www.solarlog-home.de a free homepage including free email notification. After registration you will receive the access data via email, which you enter into the SolarLog configuration.

There's no need to use an FTP program as the entire homepage is already preconfigured.

Notifications via SMS in case of plant problems are also possible at a small charge.

3.7 Automatic alerts

An important point of the SolarLog1000 is the automatic notifications, that can be sent via email or SMS.

The following notification possibilities are available:

1. Inverter failure notification
2. Fault alert from performance monitoring notification
3. Fault notification from status/error code monitoring
4. Alarm message due to alarm contact (anti-theft device)
5. Yields overview

Depending on whether the message is an email or SMS, the text content looks differently. This is because the text is limited to 160 characters for SMS messages.

The following examples demonstrate the different notification types.

3.7.1 Inverter failure message - email

Subject:

SolarLog - Inverter failure from 29.12.05 - 11:50:00

Content:

Inverter-1 'Garage' (Serial no. 1100046563) is offline, possible breakdown! Please check!

3.7.2 Inverter failure message - SMS

Subject:

SMS PV failure

Content:

Inverter-2 'Barn' (Serial no. 2000069376) is offline, possible breakdown!

3.7.3 Fault alert from performance monitoring - email

Subject:

SolarLog - Fault alert from performance monitoring from 01.01.06 - 11:05:00

Content:

Module field 1 - Inverter-1 'Inverter 1' (Serial no. 1100046563)

String 2: P target = 931 W, P actual = 534 W, Diff. = 43%

3.7.4 Fault alert from performance monitoring - SMS

Subject:

SMS PV power

Content:

Inverter-3 'Roof' (Serial no. 2000067623): P target =1364W, P actual=900W, Diff.=35%

3.7.5 Fault alert from status/error code monitoring - email

Subject:

SolarLog - fault notification from status/error code monitoring from
02.01.06 - 15:47:30

Content:

Inverter-1 'Garage' (Serial no. 1100046563) at fault!

Status=8 Fault, Error=55 Shutdown,

3.7.6 Fault alert from status/error code monitoring - SMS

Subject:

SMS PV Status/Error

Content:

Inverter-1 'Garage' (Serial no. 1100046563) at fault!

Status=8 Fault, Error=55 Shutdown,

3.7.7 Alarm notification via alarm contact - email

Subject:

SolarLog - Alarm triggered by contact at 02.01.06 - 15:47:30

Content:

Plant: Solar devices from the family ...

Operator: family ...

Warning! The alarm contact on the anti-theft device was
activated. Please check immediately!

3.7.8 Alarm notification via alarm contact - SMS

Subject:

SolarLog - Alarm triggered

Content:

Warning! The alarm contact on the anti-theft device was
activated. Please check immediately!

3.7.9 Yield overview - email

(Total of all inverters)

Subject:

SolarLog - Income overview from 01.01.06 - 20:00:00

Content:

Day:

Total	7.10 kWh
Spec.	1.58 kWhp
Max	3.13 kW
Target	2.55 kWh
Actual	278 %

Month:

Total	7.10 kWh
Spec.	1.5 kWhp
Max	0.0 kWhMax
Average	0.0 kWh
Target	2.5 kWh
Actual	278 %

Year:

Total	7 kWh
Spec.	1 kWhp

3.7.10 Yield overview - SMS

(Total of all inverters)

Subject:

SMS PV yield

Content:

Day:7.1kWh, 1.5kWhp, 3138WMax, 278% Actual Month:7kWh, 1kWhp, 0kWhMax, 0kWh, 278%Actual Year:7kWh, 1kWhp

The underlined part in the subject of the SMS is used as a keyword and is configurable.

3.8 Yield data

There are several possibilities for visualizing the yield data. The data can be displayed in a screen filling view, or alternatively in a small specially developed for PDAs view. Furthermore, all data can be transferred to the homepage to enable a remote query.

In each view, you can choose between daily, monthly and yearly view, and a partial overall view of all saved years.

It's also possible to view earlier data (e.g. previous day or month) through the arrow symbols "Next/Previous".

3.8.1 PC Visualization

This standard view opens in a separate window and has

1. Daily overview
2. Monthly overview
3. Yearly overview
4. Total overview

3.8.1.1 Daily overview

It always starts with the current date in the Day view. Using the arrow symbols on the top left, various day views can be selected. If you click on the Date under the heading "Daily Overview" you get into the Month view.

The daily yield curve is made up out of 5-minute averaged values put together.

Depending on the number of connected inverters (max. 10), a corresponding number of inverter symbols appears. The symbol on the very left stands for all inverters, the symbols on the right of that are for individual inverters. The colours of the symbols serve only to distinguish the individual inverters. Each symbol can be selected separately and combined individually or combined altogether. An icon with a "tick" means that the yield information of the desired inverter is displayed. If only a single tick with a single inverter is set, then this one inverter with its entire string information will be shown. Of course, only if the inverter is a multi-string model.

The yield curve of all inverters in total or only a single inverter is shown as a yellow area. Other information, like individual inverters or single strings is shown with coloured lines.

The Y-scale comes automatically from the inverters selected and is determined by the Max-power from the inverter configuration.

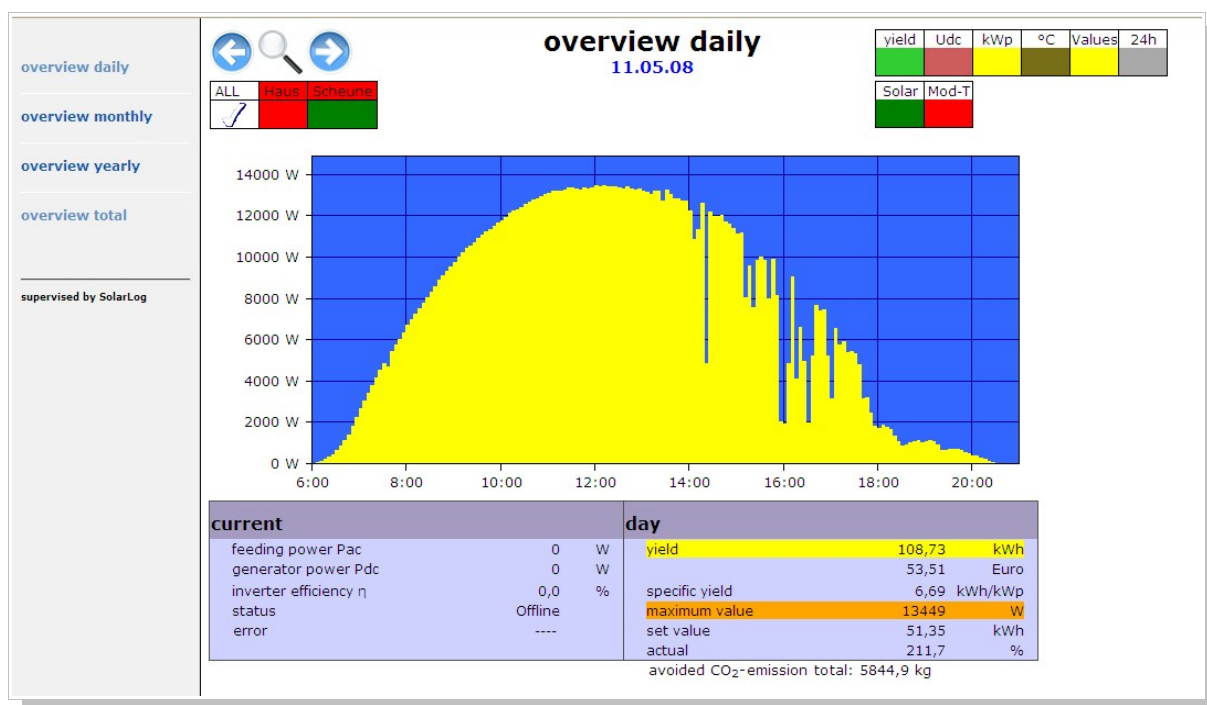
Using the buttons on the top right, even more information is available.

Yield: Here, a yield line is displayed, showing the current day's total. In addition, a green line shows the target total for the day.

Udc: This shows the generator voltage. To show the voltage of the individually strings, only 1 inverter can be selected.

kWp: With this setting, the left scaling of the "Power in watts" gets changed to "Power in kW/kWp". That means the performance of a string or inverter is divided by the generator power that's connected. Thus, all curves are comparable with respect to their specific performance and a visual control of the performance can be made. Strings with the same module orientation and slope should "overlap", i.e. lie on top of each other. If not, shading exists in most cases, but it can also be an installation error, e.g. if a module was forgotten to be installed or was connected to another string. Likewise, declining module performance can be detected.

°C: Here the inverter internal temperature is shown. Especially devices with a fan can be indirectly monitored, whether the fan still works properly and the hot air is being transported away from the device. Please note that inverters are designed for high indoor temperatures. The temperature display only shows in inverters which also provide the corresponding measurement value (i.e. not with SMA and Fronius).



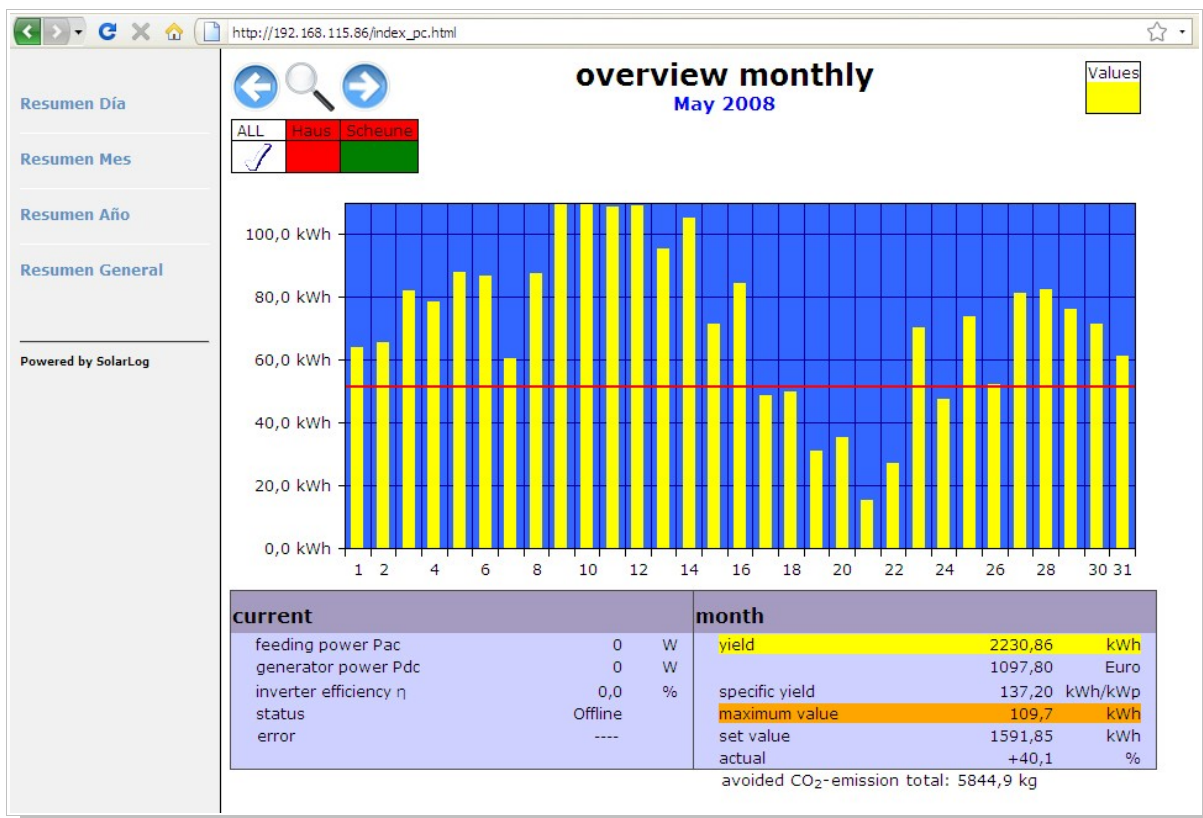
The table beneath that on the left side always shows the current values. On the right side, however, the day-specific values are shown:

Product label	Unit	Description
Feed performance Pac	W	The current fed power P on AC side
Generator power Pdc	W	The current fed power P on DC side (= solar generator). If only a single multi-string inverter is selected, the individual strings will be shown separately
Inverter efficiency η	%	The current efficiency 'Eta' taken from generator power and feed performance. The manufacturer's information regarding efficiency of the inverter can be controlled here.
Status / Error		Status code and depending on the inverter also an error code. The displayed codes are dependent on the manufacturer and need to be viewed in the manuals of the individual inverters. The same status messages are always grouped together. If all inverters are in the Mpp mode then "Mpp" appears. If one of them for e.g. is in Derating mode, then this would look like: "2xMpp, 1xDerating"
Day yield	kWh	The day's total
Day yield	Euro	The daily total is multiplied by the feed-in tariff.
Specific day Yield	kWhp	The day's total is divided by the plant size. This value is a good comparison value to other plants.
Maximum value	W	The maximum power value within one day.
Target	kWh	The SolarLog ¹⁰⁰⁰ uses a statistical forecast, that assigns to each month a specific target value. The month's target is set here as a daily target and displayed here. If the target

		value of the day's earnings is reached or exceeded, then the forecasted performance has been reached.
Actual	%	The actual percentage value shows the proportion between the day's actual yield and target yield.

*Only the selected inverters are added up and displayed.

3.8.1.2 Monthly overview



The operation corresponds to the day view. Through the menu items on the left you can select other time periods, where you can go to the previous or next month selected via the arrow symbols. If you click on the date under the heading "Monthly Overview" you reach the years overview. Using the inverter symbols, the day's yield can be displayed as a bar graph.

The daily income is displayed in total as a bar graph. If you click on an individual bar, then you are taken back to the day overview of the corresponding date. Depending on whether the current values of that day are still in memory, the day's values will be displayed.

The green line shows the day's target yield.

The table beneath that on the left side always shows the current values. On the right side, on the other hand, are the month's specific values:

Product label	Unit	Description
---------------	------	-------------

Feed performance P_{ac}	W	The current fed power P on AC side
Generator power P_{dc}	W	The current fed power P on DC side (= solar generator). If only a single multi-string inverter is selected, the individual strings will be shown separately
Inverter efficiency η	%	The current efficiency 'Eta' taken from generator power and feed performance. The manufacturer's information regarding efficiency of the inverter can be controlled here.
Status / Error		Status code and depending on the inverter also an error code. The displayed codes are dependent on the manufacturer and need to be viewed in the manuals of the individual inverters. The same status messages are always grouped together. If all inverters are in the Mpp mode then "Mpp" appears. If one of them for e.g. is in Derating mode, then this would look like: "2xMpp, 1xDerating"
Month's yield	kWh	The Month's total
Month's yield	Euro	The monthly total is multiplied by the feed-in tariff.
Specific Month's Yield	kWhp	The month's total is divided by the plant size. This value is a good comparison value to other plants.
Maximum value	W	The maximum power value inside a month.
Target	kWh	The SolarLog ¹⁰⁰⁰ uses a statistical forecast, that assigns to each month a specific target value. If the target value of the month's earnings is reached or exceeded, then the forecasted performance has been reached. Note that the month's target value is calculated daily and proportionally. First month's target = month target / number of days of the month
Actual	%	The actual percentage value indicates the proportion between the actual month and the month's target yield.

*Only the selected inverters are added up and displayed.

3.8.1.3 Yearly overview

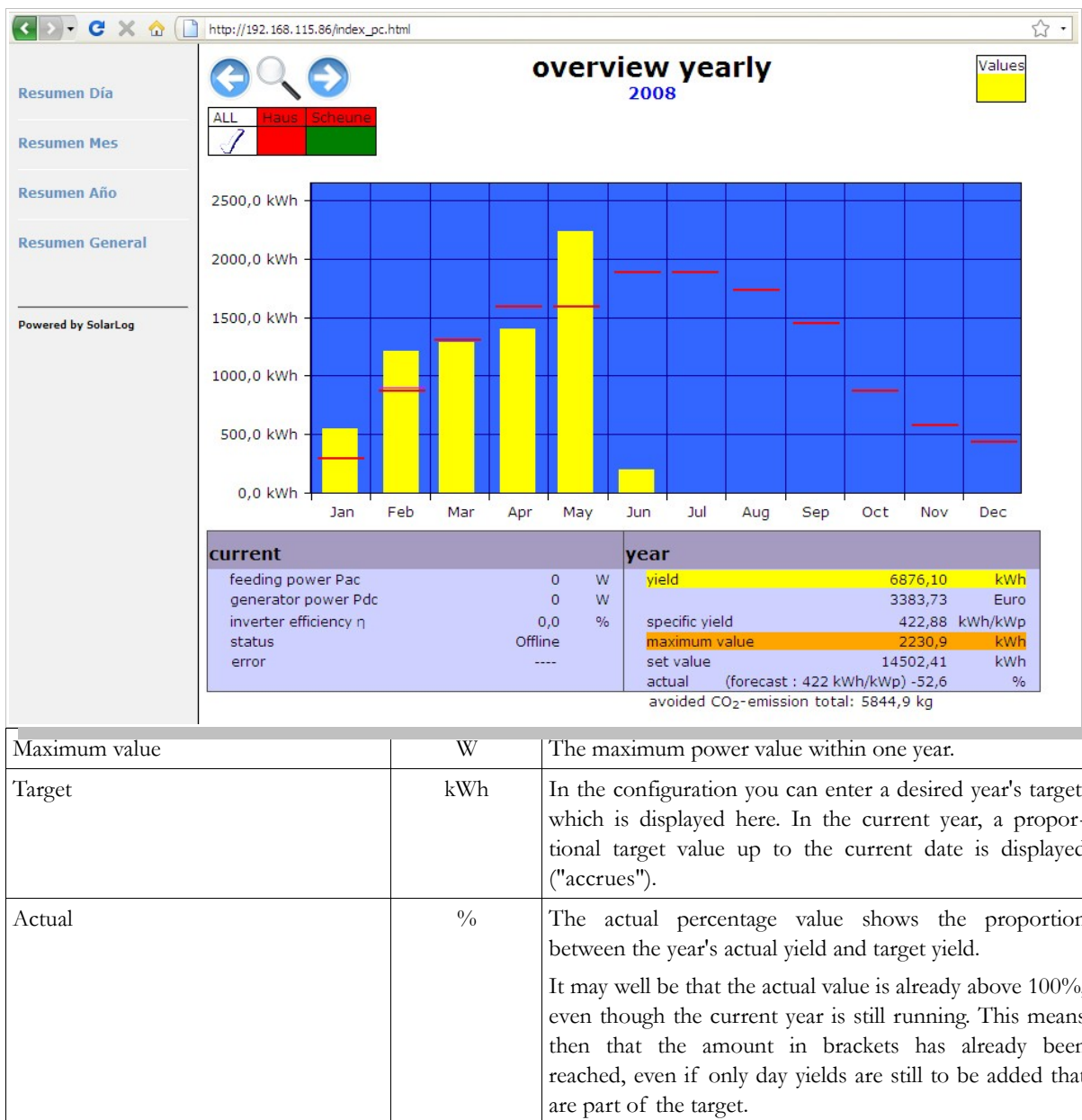
The operation corresponds to the month's view. Through the menu points on the left you can select other time periods, where you can go to the previous or next year selected via the arrow symbols.

The individual month's income is displayed in total as a bar graph.

The green line shows the desired month's target yield.

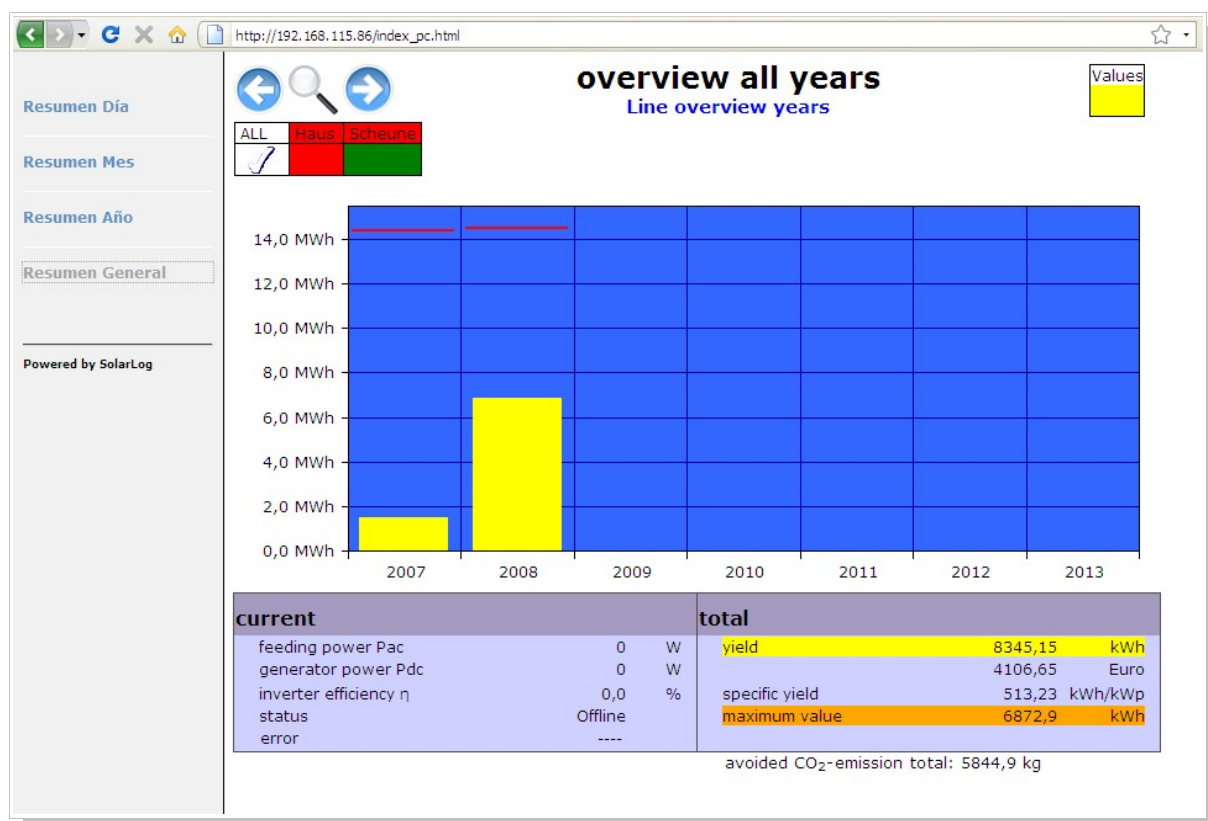
If you click on an individual bar, then you are taken back to the monthly overview of the corresponding month. There are daily data available for the past 3 years.

The table beneath that on the left side always shows the current values. On the right side, however, the day-specific values are shown:



*Only the selected inverters are added up and displayed.

3.8.1.4 Total overview



The operation corresponds to the year's view. Through the menu points on the left you can select other time periods, where you can go to the previous or next intervals selected via the arrow symbols (if in memory).

The years incomes are displayed in total as bar graphs.

The green line shows the desired year's target yield.

If you click on an individual bar, then you are taken back to the year's overview of the corresponding year's date.

The table beneath that on the left side always shows the current values. On the right side, however, the total values are shown:

Product label	Unit	Description
Feed performance Pac	W	The current fed power P on AC side
Generator power Pdc	W	The current fed power P on DC side (= solar generator). If only a single multi-string inverter is selected, the individual strings will be shown separately
Inverter efficiency η	%	The current efficiency Eta' taken from generator power and feed performance. The manufacturer's information regarding efficiency of the inverter can be controlled here.
Status / Error		Status code and depending on the inverter also an error code. The displayed codes are dependent on the manufacturer and need to be viewed in the manuals of the individual inverters.

		The same status messages are always grouped together. If all inverters are in the Mpp mode then "Mpp" appears. If one of them for e.g. is in Derating mode, then this would look like: "2xMpp, 1xDerating"
Total yield	kWh	The total sum over all years
Total earnings	Euro	The monthly total is multiplied by the feed-in tariff.
Specific Total Yield	kWhp	The total sum is divided by the plant size. This value is a good comparison value to other plants.
Maximum value	W	The maximum year's yield.

*Only the selected inverters are added up and displayed.

In the overall view, the avoided CO2 emission is displayed, although 0.7 kilograms of CO2 per kWh of electricity generated is to be expected.

3.9 Diagnosis

The main task of SolarLog¹⁰⁰⁰ is the early detection of plant problems. In addition to the automatic alarm possibilities per email and SMS, the SolarLog¹⁰⁰⁰ offers via this menu item further diagnostic possibilities which can be called upon at any time.

3.9.1 Event log

Every inverter is separately monitored and evaluated by the SolarLog¹⁰⁰⁰. This includes the continuous readout of the internal status and error codes. These codes can differ from inverter to inverter and are explained in the manuals of the inverters.

Note SMA codes: All definitions shown on the SolarLog are original SMA definitions. These definitions are explained to a large part in the manual of the SMA inverter.

Any status and error code change is logged accurately in the event log. Even offline times, which means times where the inverter is turned off, are logged.

The event log should be regularly reviewed, to make sure no irregularities are occurring.

Possible abnormalities are as follows:

- Power disruption during the day
- Frequent "derating" of an inverter. The inverter regulates the feed-in performance for overload or due to too high operating temperatures.

It's perfectly normal if the status keeps changing mornings and evenings, for example when the inverter awakes from the "night's sleep" or when "shutdown" occurs.

The event log is in the form of a table and displays all the current entries. The log has a capacity of 200 events per inverter.

Using the selection possibilities, you can filter the individual inverters by date, in order to identify the problems faster.

Degradation

Event records

Degradation

Event records

All Plant groups

all inverter

All days

All Status

All error

Reset selection

INV	Events starting - until	status	error
1	03.06.08 11:24:45 -	255 - Offline	- ----
1	03.06.08 05:37:21 - 11:24:44	0 - DATA	- ----
1	02.06.08 19:55:00 - 03.06.08 05:39:08	255 - Offline	- ----
1	02.06.08 05:26:43 - 19:54:59	0 - DATA	- ----
1	01.06.08 21:21:44 - 02.06.08 05:29:59	255 - Offline	- ----
1	01.06.08 05:23:49 - 21:21:43	0 - DATA	- ----
1	31.05.08 21:27:19 - 01.06.08 05:26:15	255 - Offline	- ----
1	31.05.08 05:26:05 - 21:27:18	0 - DATA	- ----
1	30.05.08 21:21:44 - 31.05.08 05:28:27	255 - Offline	- ----
1	30.05.08 05:25:00 - 21:21:43	0 - DATA	- ----
1	29.05.08 21:20:00 - 30.05.08 05:27:20	255 - Offline	- ----
1	29.05.08 11:07:14 - 21:19:59	0 - DATA	- ----
1	29.05.08 11:06:45 - 11:07:13	255 - Offline	- ----
1	29.05.08 05:46:46 - 11:06:44	0 - DATA	- ----
1	28.05.08 21:27:42 - 29.05.08 05:51:24	255 - Offline	- ----
1	28.05.08 16:28:38 - 21:27:41	0 - DATA	- ----
1	28.05.08 16:28:07 - 16:28:37	255 - Offline	- ----
1	28.05.08 12:46:52 - 16:28:06	0 - DATA	- ----
1	28.05.08 12:46:23 - 12:46:51	255 - Offline	- ----
1	28.05.08 05:39:10 - 12:46:22	0 - DATA	- ----
1	27.05.08 21:17:19 - 28.05.08 05:40:38	255 - Offline	- ----
1	27.05.08 18:08:41 - 21:17:18	0 - DATA	- ----

Solar modules "age" over the years, which means that yield performance even with the same sun radiation gets less with time. The module manufacturers give performance guarantees, usually around 80% of the rated output over 20 to 25 years. How should the module performance be compared and evaluated over the years? Every year is different and never comparable.

The SolarLog¹⁰⁰⁰ provides a statistical analysis of each year on the basis of daily yields.

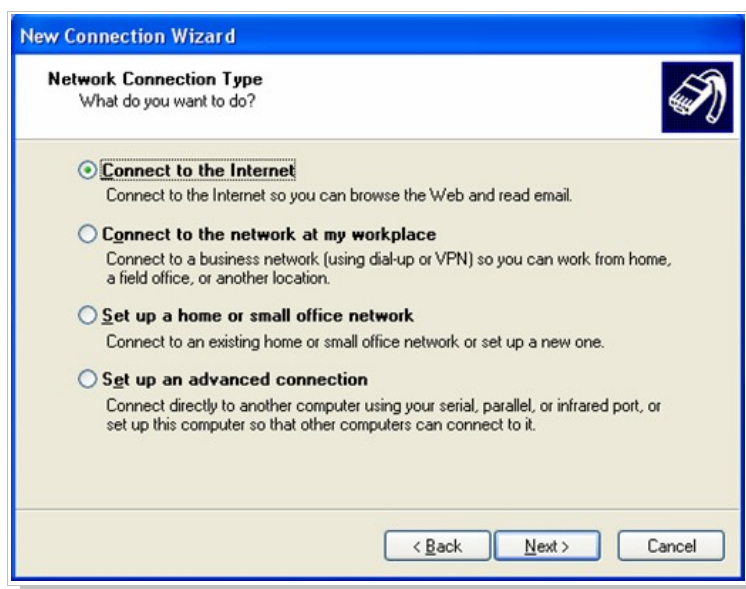
Also for each year the "average daily maximum value" is calculated.

This is calculated from actual maximum values and a statistical approximation, in order to filter out extreme peaks. The comparison of these calculated maximum values allows conclusions on the performance of the plant.

Requirements for a data comparison are enough data records per year and the identical plant technology. Especially the days of Spring and Summer are important for a comparison, because this is when the maximum yields take place.



Click on "Next." Now select "Connect to the Internet"



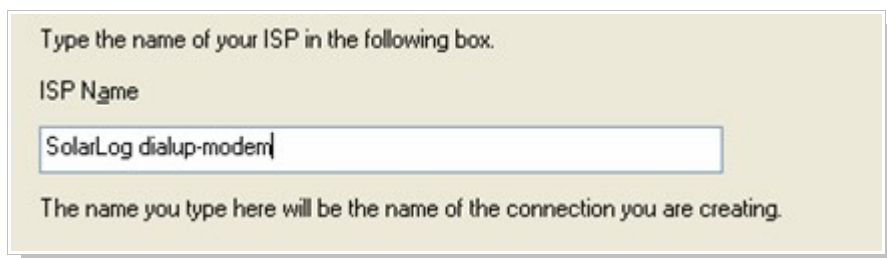
–Then click the "Next" button. Now select "Setup my connection manually"



1. Again click on "Continue". Now select "Connect using a dial-up modem"



• You will be prompted to enter a "Name of the Internet service provider". Enter here "SolarLog dial-up modem" and press "Next".



- Now you need to specify the number under which the modem of the SolarLog is reachable at.
- In the next dialogue enter in Username "solarlog" and password is also "solarlog". It is recommended to modify the default password. The bottom two check boxes please leave empty as indicated in the picture.



- Click on "Next." In the next dialogue, click the check-box "Icon on desktop" and click "Finish". Now the dial-up modem is ready to use.
- On the desktop is now the appropriate dial-in icon. Click on it. It opens a dialogue, which now starts the dial-in. Click "Dial". For a test, turn on your PC/Notebook's speakers and you should hear the modem dialling, which is the typical high-pitched sound.
- Once connected, Windows gives you a notification and the dial-in window shrinks to the right below the status bar.
- Open the web browser, enter the following IP address:
192.168.49.49
- Using this address, your PC/Notebook will find the web interface of the SolarLog and display it. The screen build-up is slower than what DSL connections usually are. All the functions are there though, just as if you were accessing the SolarLog directly via a network connection.
- You can end the connection at any time, just by clicking with the right-mouse button on the dial-in symbol at the bottom right of the screen and click on "Disconnect".

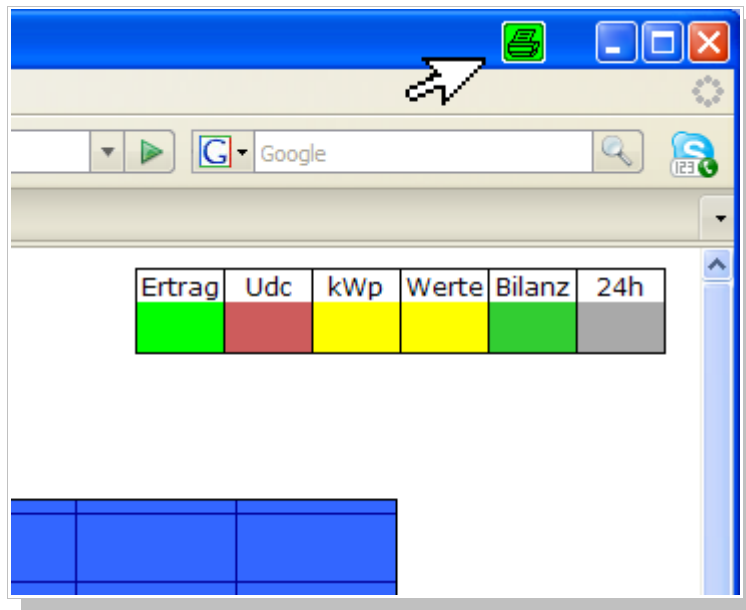
3.11 Useful software

In the Internet there's lots of useful software that make the daily interaction with the computer easier. We have a list of programs, that help particularly when working with the SolarLog. All programs are free to use.

3.11.1 Printing

Printing from the SolarLog can be done with the Print function on the internet browser. The graphical display doesn't always get printed properly or completely depending on your browser, we recommend using a very useful print program <http://www.hardcopy.de> that can be downloaded for free.

The program appears as a small symbol at the top right part of the window and prints by a simple mouse-click the current screen contents on any standard printer.



To print in landscape mode, you have to change the setting in "Settings/Options/Orientation" to "landscape".

3.12 LED status display

LED 1	LED 2	LED E	Status	Meaning	Solution
⊙	⊙	○	Initial-ization	SolarLog starts. Blinks > 5 minutes	Wait. Error. Turn electricity on/off - try again.
●	⊙	○	Ok	Read the time through the internet	
●	⊙	⊙	Error	Can't read the time	Set the time manually Test Internet access
○	⊙	○	Ok	Read configuration from inverter	Wait
○	⊙	⊙	Error	Configuration is invalid or unreadable	Check the interface Check the cable Reset to factory settings
●	●		Ok	Normal operation	

				Inverter Online	
●	○		Ok	Normal operation	
				Inverter Offline	
		●	Note / Error	Only Fronius: No data communication	1.Wait till the inverters starts feeding in 2.Check the wiring 3.Check mains power interface converter
		⊗		Plant has reported a fault. (Only SolarLog1000)	Fault report and confirmation in the dialogue "Diagnosis/messages"

- LED off
- LED on
- ⊙ LED blinks slowly
- ⊗ LED blinks fast

The red LED "P" is always lit and shows the power supply.

3.13 Reset button

The reset button has several functions which can be triggered.

1.Restarting the SolarLog (the actual reset function)

2.Reset to factory settings

The functions work after pressing and holding for a while. If the button is pressed, the LED-1 signals immediately. This is the sign that the button has been pressed.

After 5 seconds, the LED-1 signals again. If you release the button now, the SolarLog does an "orderly" reboot similar to the shutdown in Windows. Just pulling the power plug should always be avoided.

After 20 seconds, LED-1 and LED-2 signal. If you release the button now, the SolarLog is returned its factory settings. **Note:** If the button is pressed again inside 5 seconds, it won't be returned to the factory settings, almost as a safety measure to cancel the process.

4 Technical Data

Supply voltage	12 V DC (24V DC max.)	
Energy consumption	approx. 3 Watt	
Power Supply	external power adapter 12V DC	
Dimensions (W x H x D) in cm	22.5 / 28.5 / 4	
Housing	Plastic housing passively ventilated	
Interfaces	Ethernet - RJ45 socket - 10/100MBit RS485/RS422 combined S0 pulse input/output (according to DIN43864 and 62056) Reset	
Memory capacity	8 MB RAM + 1GB SD-RAM (internal only)	
Protection	IP 20 (exclusively for indoor use)	
Temperature range	-10°C to 50°C	
Display	4 LEDs for status display	
Assembly	Wall mounting	
Weight	Net SolarLog:	0.61 kg
	Net Manual, Power supply, plugs:	0.33 kg
	Gross incl. packaging:	1.13 kg

4.1 Internet ports

If the SolarLog is connected to the internet via a router, the following ports on the router need to be unlocked:

Port 21	TCP	FTP data transfer (Passive mode)
Port 25	TCP	SMTP email dispatch
Port 53	UDP/TCP	DNS name resolution (separate DNS possible)
Port 80	TCP	HTTP web server
Port 123	UDP	NTP Time Server

4.2 Timer

If a timer is used to disconnect SolarLog from the mains at night time, this may be done from 00:00 to 03:30 am. It is necessary that the SolarLog be activated at 4:00 clock, as the time adjustment and summer/winter time takes place after this time.

4.3 Activity log

Version	Date	Description
1.0.0	30.06.09	SolarLog1000

4.4 CE Declaration of Conformity

SolarLog1000

This is to certify that the designated device upholds the guidelines of the European Union, in particular in accordance with the EMV Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC.

The device meets the following standards:

EMV Directive (interference immunity, emitted interference)		
:	EN 61000-6-3	
EMV interference immunity	:	EN 61000-6-1
Device security	:	EN 60950-1

The above-mentioned device is therefore equipped with a CE label.

Rosenfeld, the 6th of May, 2009

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Photovoltaic System Monitoring



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